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THE AMERICAN
JOURNAL OF PHARMACY

JULY, 1918

EDITORIAL.

THE STORY OF THE VITAMINES.

In the present issue of the JOURNAL there is presented a number of the more recent contributions to scientific literature on the subject of the "*sitacoids*" or "*vitamines*." The necessity of presenting, to our readers, as fully as possible, the important scientific advances and the influence which the development of this subject is destined to exert on medicine and dietetics fully justifies the space devoted to this symposium. While comparatively little is yet known of the chemistry and special action of these unique substances, it is apparent that, as a class, they play a very important rôle in the nourishment and life functions of every living being.

Many of the niceties of nature's laboratories have not yet been fathomed by man and human hypotheses are often vague and at times erroneous. While the information concerning this group of food accessory factors is as yet very indefinite, the investigations so far made into this interesting and inviting field of scientific exploration seem to indicate that a veritable mine is being developed, the importance of which to human welfare can scarcely be estimated.

The desire to please the human palate has led to the elimination of certain normal constituents of food and in such refinements as degermed wheat and polished rice we have eliminated nature's provisions for maintaining the equilibrium of vital functions or for restoring such equilibrium where any derangement has occurred.

The wide distribution of these vitamines in articles of food, both of animal and vegetable origin, indicates their importance to the physiologic well being of the individual. The absence of these from an otherwise satisfactory diet of a mixture of proteins, fats, carbohydrates and inorganic salts, results in a decline in nutritive food

value, attended necessarily by debility and the individual becomes more liable to disease because of the diminished power of resistance. At present, our knowledge is sufficient, at least, to justify the opinion that the vitamines play an important rôle in sustaining normal functions of the human organs and in enabling these to ward off disease. To their absence in the food, or presence in insufficient amount is attributed some well-recognized maladies.

The discovery of the fact that the antiscorbutic vitamine is generated in the living cells of germinating legumes, not only foretells the possibility for advances in the methods of treatment of this affection but also predicts the line of investigation necessary in order to differentiate between the actions of the various sitacoids and their ultimate isolation and study. Probably one of the most important lines for these investigations to follow will be the distinguishing between those vitamines which stimulate the development of pathologic bacteria and those which are benign to human welfare.

The collection of data and the information already available and the character of the investigators engaged in this special field of study, presages the development of a knowledge that will be of the utmost value and service in solving many problems of health and of food values which, at the present time especially, are of paramount importance.

G. M. B.

THE DRUG TRADE AS A FACTOR IN RECONSTRUCTION, AND THE REHABILITATION OF THE WAR VETERAN.

The drug trade interests of the country have doubtless felt the demoralizing effects of the world war quite as much as most of the other industries of the country and after the termination of this titanic struggle, these interests will have their special problems of readjustment and reconstruction to contend with. It is none too early for the loyal citizens and business men of the United States to give earnest thought to the various national problems which we know will arise as a result of this war and the general policies which must be adopted in commercial circles. In these general problems of the post-bellum period of reconstruction, the drug and chemical trades will undoubtedly be an important factor and we can predict that they will assume their full share of the national responsibility

in these matters and faithfully discharge their full measure of obligation.

It is not too early now for the drug trade interests to look forward to the period of reconstruction and to arrange in anticipation for the services which they will be able to render as patriotic citizens and also to consider the lines of constructive operations that will redound with the greatest benefits to the special branches of commerce with which they are concerned.

The timely paper by Mr. Douglas C. McMurtrie published in this number of the JOURNAL presents plainly and forcefully to our readers an important war problem that necessarily must receive the early consideration of the loyal commercial interests as well as of the federal authorities. In the very near future we will have many returned warriors who, by reason of wounds or disease contracted in the army, will be incapacitated for military service.

The reëstablishment of these in useful employments in civil life will soon be an imminent problem. The rehabilitation of the crippled soldier as a producing factor able to contribute something toward the assets of the nation rather than to permit of his becoming a public burden, a national liability, will require in many cases a careful consideration and a wise adjustment of the concomitant conditions. Profuse sympathy or open-hearted and open-handed charity will not solve the problem. The development of the spirit of self reliance, the inculcation of the principles that lead to moral, mental and physical independence will be far more essential. The influence of example, the cheering assistance of the "Big Brother" toward a fresh upward start in life is going to be the potent force.

We foresee that the drug trade will be able to provide very many avenues for the employment of worthy veterans in accordance with their individual ability, prior education or adaptability to reëducation to new vocations. Very few of the industries open such a variety of opportunities for the employment, even of crippled soldiers, as do the various branches of the drug trade. Not only can places be found for many whose age and education will permit them to equip for a future career as pharmacists, chemists and laboratory assistants, but there are numberless avenues open in our drug trade industries for the employment of less highly specialized men. Among the possibilities in the wholesale, and manufacturing branches, for the employment of such crippled soldiers we may mention the need for watchmen, porters, order fillers, checkers, packers,

shipping clerks, stock keepers, entry and bill clerks, salesmen, accountants and office assistants in various capacities.

Our industries that have had their forces depleted by enlistments and drafts may be thus able to find, in part, the assistance so greatly needed in their own business reconstruction and at the same time aid in making the crippled soldiers self-supporting, self-reliant and in developing many of these into a higher class of citizenship. We predict that the drug trade interests will not be found wanting in accepting as a patriotic duty a full share of the national obligations to our returning soldiers and that such service will not be incompatible with the cold, stern realities of the business world but will redound with benefit to all of those directly concerned.

G. M. B.

THE ROMANCE OF THE CHEMICAL ELEMENTS.

Their History and Etymology.

By Ingo W. D. Hackh, A.B.,

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Revolution is everywhere. Our views and opinions are slowly and steadily undergoing a change, not only in political and social ideas, but also in our conception of the material world surrounding us. In many fields of human activities we are progressing rapidly; though some pessimists may predict a dark future for mankind, there is enough evidence of our progress. Philosophers ask often if we are progressing in the right direction, and if we become better people by travelling faster and living more comfortable than ever before? It seems to me that we are, for our social conditions become better, though there is still much reforming to do. For a student of history there is no doubt that our road lies toward a really democratic state of coöperation. At present the world war is paramount in our interests, and we all feel, or should feel, that our brothers in Europe are fighting and dying for the progress of mankind. There will result a better world when the power of autocracy is diminished.

But aside from the mighty changes impending in world politics, there is in the peaceful fields of science a great revolution of ideas.

TABLE I.

The Atomic "Numbers" and the Periodic System of the Chemical Elements.

⑤	58 Ce	59 Pr	60 Nd	61	62 Sa	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm′	70 Tm″	71 Yb	72 Lu	⑤
	50 Sn		51 Sb		52 Te	53 I		54 Xe		55 Cs		56 Ba	57 La		58 Ce	
	32 Ge		33 As		34 Se	35 Br		36 Kr		37 Rb		38 Sr	39 Y		40 Zr	
②	14 Si		15 P		16 S	17 Cl		① 18 Ar		19 K		20 Ca	21 Sc		22 Ti	③
	6 C		7 N		8 O	9 F		10 Ne		11 Na		12 Mg	13 Al		14 Si	
						1 H		2 He		3 Li		4 Be	5 B		6 C	
	22 Ti		23 V		24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu		30 Zn	31 Ga		32 Ge	
④	40 Zr		41 Cb		42 Mo	43	44 Ru	45 Rh	46 Pd	47 Ag		48 Cd	49 In		50 Sn	④
	72 Lu		73 Ta		74 W	75	76 Os	77 Ir	78 Pt	79 Au		80 Hg	81 Tl		82 Pb	
⑥	82 Pb		83 Bi		84 Po	85		86 Nt		87		88 Ra	89 Ac		90 Th	⑥
	90 Th		91 Bv		92 U											

This table shows the atomic number and the symbols of the elements. There are in section

① the *noble gases,* electropotential 0, forming no compounds,
② the *nonmetals,* strong electro-negative, forming acids,
③ the *light metals,* strong electro-positive, forming bases,
④ the *heavy metals,* electro-negative and -positive,
⑤ the *rare earth metals,* weak electro-positive,
⑥ the *radio-active elements,* weak electropotential.

The first and last column contains the elements of the carbon family, which are enumerated twice, for they form the connecting links or transitions between the different sections. Many relationships exist between these sections and elements, which are embodied in the so-called *periodic system.* Not yet discovered elements are those indicated by Nos. 43, 61, 75, 85 and 87.

So often in the past experiences of mankind have theories been created and abolished, that it seems to many an observer simply a repetition of the old process. Yet it is more than that.

I need not go into the details of the history of the conception of

an element, for the readers will all be familiar with the changing ideas concerning it. But I want to point out one great difference in the standpoint of modern science as compared with the Greek philosophers. Since the introduction of experimental research, mankind has been enabled to accumulate a great deal of facts, which the ancients did not possess. Every discovery of to-day, every technical achievement of to-day, in fact every new invention is built upon the experiences of our forefathers. There is causality in the material world.

With regard to the chemical elements we have now collected and accumulated enough data to enable us to say that there are 92 chemical elements, of which 5 have not yet been discovered. From the results of modern researches on the X-ray spectra of the elements we are justified in ascribing an "atomic number" to each element. This number indicates simply the relative position of the spectral lines for each element. But this number increases strictly in accordance with the atomic weight. Table I gives the atomic number for each element and shows at the same time a modified arrangement of the periodic system.

Our series of elements begins with hydrogen No. 1, and ends with uranium No. 92, and we must assume that under the present cosmical condition upon our earth no more elements can exist. For an atom of uranium has become already so unstable that it decomposes and gives rise to a series of radioactive substances. And, though there are some indications of elements lighter than hydrogen in the sun corona and star nebula, we have every reason to believe that elements lighter than hydrogen do not exist upon our earth. Thus we have our system of elements limited to 92, of which the last 12, that is from No. 80 on, form the series of radioactive elements, whose atoms are so unstable that they disintegrate and break apart, forming elements of lower atomic weight, and also producing the so-called "isotopes." For accuracy's sake I have given in Table II the disintegration series of uranium, thorium and actinium, from which the isotopes for each of the radioactive elements can be seen in the vertical column.

Missing Elements.

The five missing elements are those with atomic number 43, 61, 75, 85 and 87. Of these the element 61 belongs to the rare earths, as seen from the periodic table in Table I, Nos. 43 and 75 are ele-

TABLE II.

The Radio-Active Elements. (*Sect. 6 of Table I.*)

Group.....	3B	4	5A	6A	7A	0	1A	2A	3A	4	5B	6B
Number.....	81	82	83	84	85	86	87	88	89	90	91	92
Symbol	Tl	Pb	Bi	Po		Nt		Ra	Ac	Th	Bv	U
At. W.	204.0	207.2	208.0	210		222.2		226.2	?	232.2	234.2	238.4
		PbRa 206	←	RaF 210								
			RaE 210	↗				ThX 224 AcX ? Ra 226	←	RaTh 228 RaAc ? Io 230	←	U 234
		PbTh 208 PbAc ? RaD 210	↗	ThC′ 212 AcC′ ? RaC′ 214			←		MsT″ 228 Ac ?		Uz ? Ux″ 234	
	ThD 208 AcD ? RaC″ 210		ThC 212 AcC ? RaC 214	↗					←	←		
		←						MsT′ 228		Th 232	↗	
		ThB 212 AcB ? RaB 214	↗	ThA 216 AcA ? RaA 218	←	ThEm 220 AcEm ? RaEm 222				Uy ? Ux′ 234	←	U 238
		←		←		↓						
No. of isotopes..	4	7	4	7	0	3	0	4	2	6	2	2

The distintegration or breaking up of the radioactive substances is indicated by the arrows. Thus:

← (horizontal arrow) indicates the loss of a helium atom (alpha-radiation), the element becomes more electro-positive and the atomic weight decreases by 4.

↗ (inclined arrow) indicates the loss of an electron (beta-radiation), the element becomes more electro-negative and the atomic weight remains the same.

The atomic weight of the actinium series is uncertain, also its origin, but probably it branches off from U through Uy and Uz. It will be noticed that the disintegration from RaTh, RaAc and Io on follows for all three series in the same order, with the exception that at the end RaD breaks further up into RaE then RaF then PbRa.

ments of the manganese group with atomic weights of about 98 and 187, and properties which are between those of the chromium and platinum group. The last two elements, Nos. 85 and 87, belong to the radioactive substances, and there is the theoretical possibility that, owing to their great electropotential, they are not able to exist. That is to say, the periodic system requires, *e. g.*, the element No. 87 to be the most electro-positive element, more electro-positive than cæsium, and at the same time unstable, that is, radioactive. It is very possible that such an element has so short a life, like brevium, that it can practically not exist.

Names of the Elements.

Let us return to the known elements. When one looks over the list of pretty names, one naturally wonders how they came about. And indeed some of them have a very interesting story. States and planets, colors and mineral names are represented. We have, *e. g.*, Europe in europium, France in gallium, Norway in thulium, America in columbium, Russia in ruthenium, Germany in germanium, Scandinavia in scandium, Poland in polonium, Cyprus in copper. From our solar system we have represented the sun in helium, earth in tellurium, moon in selenium, mercury in mercury, uranus in uranium, and the little planets or asteroids are also represented: Ceres in cerium, Pallas in palladium. The mythologies of various nations have been ransacked and furnish us iridium from Iris, niobium from Niobe, tantalum from Tantalus of the Greek mythology, while thorium from Thor, vanadium from Vanades are taken from the Scandinavian mythology.

The city of Paris is represented in lutecium, while the Scottish village Strontian is honored in strontium and the town of Ytterby in Sweden has the unique distinction of having four elements named after it, namely ytterbium, yttrium, terbium, erbium.

According to their color several elements have been named from the Greek or Latin terms: color—chromium; white—silver; yellow—chlorine; green—thallium and praseodymium; blue—cæsium and indium; purple—iodine; red—rhodium and rubidium. Many other properties have played a rôle in giving a name to an element, as shown in Table III. There is a certain regularity in this apparent disorder of naming. For instance in the time of Lavoisier the elements hydrogen, nitrogen, oxygen were discovered and named by

TABLE III.

Etymology of the Chemical Elements.

Name.	Symbol.	Number.	Etymology.	In Allusion, in Honor of
Actinium	Ac	89	Lat. activus = active	Radioactivity
Aluminum	Al	13	From alumen	Alum
Antimony	Sb	51	Doubtful	
Argentum	Ag	47	Gr. argyros = silver, argos = white	Its luster
Argon	A	18	Gr. argon = lazy, inert	Its inertness
Arsenic	As	33	Gr. arsenikon, from arsen = male	Its use as paint
Aurum	Au	79	Hebr. awr = light fire, Lat. aurora	Its luster
Barium	Ba	56	Gr. barys = heavy	Its weight
Beryllium	Be	4	Gr. beryllos = a green gem: beryl	Occurrence
Bismuth	Bi	83	Arab. wiss majat = easily melting metal	Fusibility
Boron	B	5	From borax	Occurrence
Brevium	Bv	91	Lat. brevis = short	Short life
Bromine	Br	35	Gr. bromos = stench	Odor
Cadmium	Cd	48	Gr. kadmia = calamine	Occurrence
Caesium	Cs	55	Lat. caesius = sky blue	Blue line in spectrum
Calcium	Ca	20	Lat. calix, Gr. chalix = lime	Occurrence
Carbon	C	6	Lat. carbo = coal	Occurrence
Cerium	Ce	58	Lat. Ceres = goddess of agriculture	New discovered planet
Chlorine	Cl	17	Gr. chloros = yellowish green	Color of gas
Chromium	Cr	24	Gr. chromos = color	Various colors of compounds
Cobalt	Co	27	Germ. kobold = goblin	(See text)
Columbium	Cb	41	Columbia = Amercia, columbite	Occurrence
Copper	Cu	29	Gr. Kyprics = Cyprus, Lat. cuprum	Occurrence
Denebium (Didymium)	De	69	From the star Deneb (in the swan) Gr. didymos = twins (see Nd and Pr)	
Dubhium	Db	70	From the star Dubha (Great Bear)	
Dysprosium	Dy	66	Gr. dysporos = difficult	Difficult separation
Erbium	Er	68	Swedish town Ytterby	Occurrence
Europium	Eu	63	Europe	Europe
Ferrum	Fe	26	Lat. ferrum	
Fluorine	Fl	9	Fluorspar	Occurrence
Gadolinium	Gd	64	Gadolinite	Occurrence
Gallium	Ga	31	Lat. Gallia = France	France
Germanium	Ge	32	Lat. Germania = Germany	Germany
Glucinium	Be	4	Gr. glycos = sweet	Taste of compds.
Gold	Au	79	Doubtful	
Helium	He	2	Lat. helios = sun	Discovery in sun chromosphere
Holmium	Ho	67	Swedish geologist G. Holm	
Hydrargyrum	Hg	80	Gr. hydrargyros = water and silver	"Molten silver"
Hydrogen	H	1	Gr. hydros = water, gennao = produce	"Water-producing substance"
Indium	In	49	Lat. indicum = indigo	Color of spectral line
Iodine	I	53	Gr. iodes = violet color	Color of vapor
Iridium	Ir	77	Gr. Iris = rainbow	Color of salt solutions
Iron	Fe	26	Old high German isarn = iron	
Kalium	K	19	Arab. kali = ash (potash)	Occurrence
Krypton	Kr	36	Gr. krypton = hidden, secret	Obscurity

TABLE 3.—*Continued.*

Name.	Symbol.	Number.	Etymology.	In Allusion, in Honor of
Lanthanum	La	57	Gr. lanthanon = concealed	Obscurity
Lead	Pb	82	Doubtful	
Lithium.....	Li	3	Gr. lithos = stone	Occurrence
Lutecium	Lu	72	Lat. Lutetia = Paris	City of Paris
Magnesium.....	Mg	12	Magnesite, from city of Magnesia	Occurrence
Manganese	Mn	25	Gr. manganidso = purify	Use in glass manufacturing
Mercury	Hg	80	Lat. Mercurius = messenger god	
Molybdenum ...	Mo	42	Gr. molybdaina = lead oxide	
Natrium	Na	11	Hebr. nether = carbonate of soda	
Neodymium	Nd	60	Ger. neon = new, didymos = twins	New-didymium
Neon	Ne	10	Gr. neon = new	The new gas
Nickel	Ni	28	Old German nickel = devil	(See text)
Niobium.....	Cb	41	From Gr. Niobe, daughter of Tantalus	Associated with Tantalum
Nitrogen	N	7	Lat. niter, Gr. gennao = produce	Niter producing substance
Osmium.....	Cs	76	Gr. osme = odor	Smell of its tetroxide
Oxygen	O	8	Gr. oxys = sour, gennao = produce	Acid-producing element
Pal'adium.....	Pd	46	From planet Pallas	
Phosphorus.....	P	15	Gr. phos = light, phero = bring, carry	Light-carrying element
Platinum.....	Pt	78	Span. platina = diminutive for silver	"Little silver"
Plumbum	Pb	82	Latin plumbum nigrum = lead	
Polonium	Po	84	From Poland	Poland
Potassium.....	K	19	From potash	Occurrence
Praseodymium..	Pr	59	Gr. Prason = leek green and didymium	"Green didym"
Radium.....	Ra	88	Lat. radio = to shoot rays	Radioactivity
Rhodium.....	Rh	45	Gr. rodeos = rose red	Color of compounds
Rubidium	Rb	37	Lat. rubeus = ruby red	Color of spectral line
Ruthenium.....	Ru	44	Lat. Ruthenia = Russia	
Samarium.....	Sa	62	From samarskite	Occurrence
Scandium	Sc	21	From Scandinavia	Scandinavia
Selenium.....	Se	34	Gr. selene = moon	Associated with tellurium (earth)
Silicon.....	Si	14	Lat. silex = flint, silicia	Occurrence
Silver.....	Ag	47	Doubtful	
Sodium	Na	11	From soda	Occurrence
Stibium.....	Sb	51	Gr. stibi = antimony sulfide	Occurrence
Stannum.....	Sn	50	Lat. stagnum, stannum = tin alloy	
Strontium.....	Sr	38	From strontianite	Occurrence
Sulphur.....	S	16	Lat. sal = salt, Gr. pyr. = fire	
Tantalum	Ta	73	From Tantalus (tantalize)	Difficult isolation
Tellurium	Te	52	Lat. tellus = earth	
Terbium	Tb	65	From Swedish town Ytterby	Occurrence
Thallium.....	Tl	81	Gr. thallos = green twig	Green line in spectrum
Thorium	Th	90	North mythology: Thor	
Thulium	Tm	69	Lat. Thule = Norway or Iceland	Norway

TABLE 3.—*Continued.*

Name.	Symbol.	Number.	Etymology.	In Allusion, in Honor of
Tin.....	Sn	50	Lat. stannum = tin	
Titanium	Ti	22	Gr. Titanes = half gods	
Tungsten.....	W	74	Swedish tung-sten = heavy stone	Occurrence
Uranium.....	U	92	Planet Uranus	
Vanadium.....	V	23	Northern mythology Vanades = Frigg	
Wolfram	W	74	Old Germ. wolfram	Occurrence
Xenon.....	Xe	54	Gr. xenon = strange, foreign	"The strange element"
Ytterbium.....	Yb	71	Swedish town Ytterby	Occurrence
Yttrium	Y	39	Swedish town Ytterby	Occurrence
Zinc.....	Zn	30	Germ. zinke = prong, tine	Crystalline structure
Zirconium.....	Zr	40	Arab. zargun = a gem stone, zircon	Occurrence

contraction of the respective end products with the Greek gennao—I produce, thus water-producing, niter-producing and acid-producing element. Again many of the rare earth metals have been named after asteroids or other stars, thus cerium, aldebaranium (or ytterbium), cassiopeium (or lutecium), dubhium (or thulium 1), denebium (or thulium 2). Uniform is also the ending for the halogens —chlorine, bromine, iodine; while the metals end generally in -ium, and the metaloxides of the basic metals in -ia.

RARE EARTH METALS.

The rare earth metals have a very complex and confusing history, which is illustrated in their "family tree" in Tables IV and V. The first column gives the year, the last column the name of the discoverer or rather separator, for their properties are so alike that their separation is extremely difficult. Nevertheless there is a limit of their "separability," though some chemists proposed theories that there were no limit. The reason for their great similarity must be found in their atomic structure and the periodic system, for they form a very slow and gradual transition from electro-negative to electro-positive elements, and thus their difference in electropotential is very small. This is just as bridging two rivers of equal width in one case with seven, in the other case with thirty-six pillars. It is clear how the distance of the pillars in these two cases would compare to each other. So we have in the periodic system in one instance between two inert gases seven elements, which differ natu-

rally much more than when there is a period of thirty-six elements, as in the case of the period in which the rare earth metals occur. In the periodic system they form a group from cerium to lutecium, and as pointed out above, their difficult separation was the main cause for such a family tree as Tables IV and V represent.

TABLE IV.

The Family Tree of the Cerit Earths.

Year.		Discoverer.
1803	Ceria	Berzelius
1839	Cerium Lanthanum	Mosander
1841	Lanthanum Didymium	Mosander
1879	Didymium Samarium	Lecoq de Boisbaudran
1885	Praseodymium	Auer von Welsbach
1900	Neodymium	Demarcay
1918	Samarium Europium	

Number	58	57	59	60	61	62	63
Symbol	Ce	La	Pr	Nd	?	Sa	Eu
At. weight	140	139	141	144	147	150	152

The platinum metals and the noble gases have a similar history of gradual isolation, as Tables VI and VII show. In the latter the amounts are given and it is easy to understand how such small percentages may be overlooked.

HISTORY OF ELEMENTS.

In history the chronological method of tabulating facts has many advantages, and I have followed it here to point out some interesting things connected with the chemical elements. Beginning with elements known to prehistoric man (but naturally not as elements), we will select a few interesting ones.

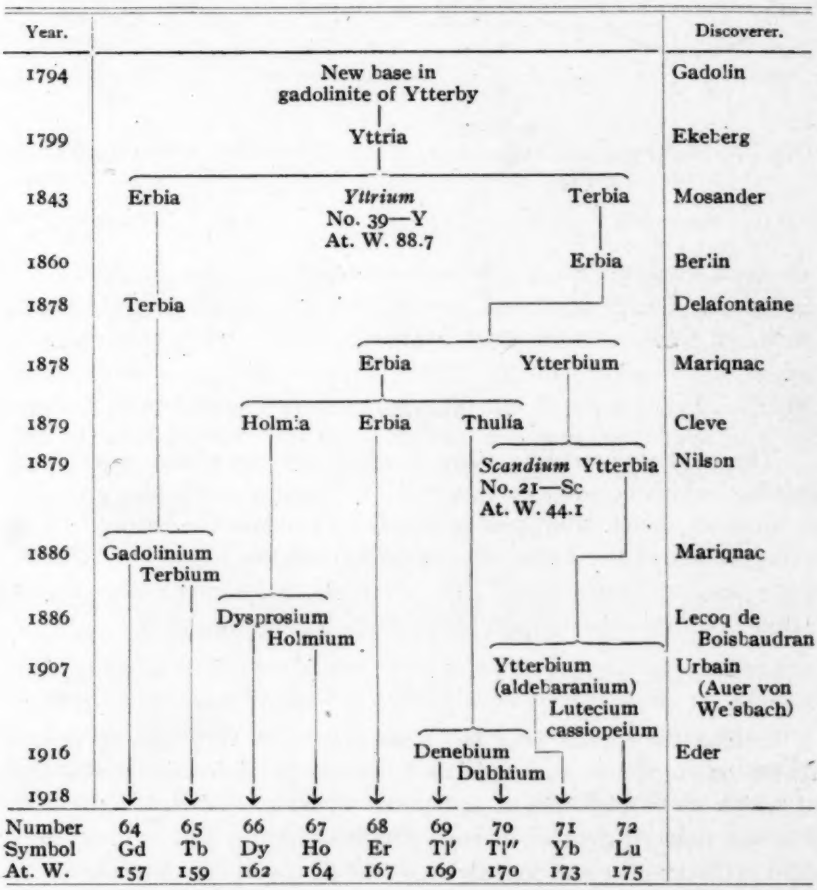
Carbon.

The discovery of fire was the greatest step toward civilization and anthropologists tell us of the mighty changes which the cooking of food caused in the human features. With fire primitive man became acquainted with *carbon,* the black residue of incomplete com-

bustion. It is interesting to note that in all Teutonic languages the word for coal is derived from the same root "kol," *e. g.*, in German —kohle, Dutch—kool, Danish—kul, Swedish—kol, which indicates

TABLE V.

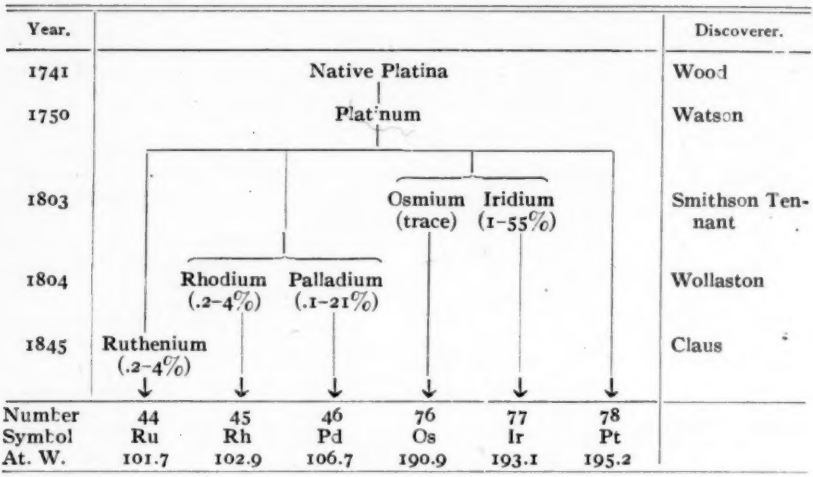
The Family Tree of the Yttria Earths.



that coal was known to the Indogermanic tribes before their prehistoric separation. In Slavic languages we find in Russian—ugoli. In Hebrew we have gehl. The term carbon is derived from the Latin "carbon" = coal, which probably comes from the Greek ἀρφω, arpho = to char, to roast.

TABLE VI.

The Family Tree of the Platinum Metals.



Sulphur.

The next non-metallic element which primitive man knew was ***sulphur,*** which occurs as a mineral. Its present name was given to it, however, much later, and indicates its combustible nature. It is a contraction of the Latin sal—salt and Greek πύρ, pyr = fire. Brimstone means "burnstone." In chemical terminology the prefix "thio-" is derived from the Greek θείον, Thion = sulphur.

Gold.

Among the metals *gold* has been known in very remote times. At the dawn of history it was the precious metal for the possession of which wars were fought and great hardships endured. We find it in the oldest Egyptian hieroglyphic inscriptions and in every ancient civilization it was known; *e. g.,* the Egyptians distinguished two kinds of gold: nub-en-mu = river-gold, and nub-en-set = mountain-gold. The first kind was washed from river sand with cloth bags, which, when inverted, formed the picture for the hieroglyph for gold. The first figure gives the older form of the hieroglyph, the second the later form.

To the philologist the name "gold" offers an interesting study

in comparing the different languages. The Teutonic languages derive it probably from the Arabic egala = shining, for we have in Swedish and Dutch—guld, German—gold, and even in Finn—kulta. The Romanic languages from the Latin aurum = gold, from aurora

FIG. 1.

FIG. 2.

FIG. 3.

and the Hebrew awr = light, fire, *e. g.*, in French—or Italian and Spanish—oro.

Silver.

Another prehistoric metal is *silver,* which occurs more frequent in Assyrian and Egyptian inscriptions, indicating that it was more common than gold. The Latin word argentum is derived from the Greek ἀργυρος, argyros = silver, which in turn comes from ἄργος, argos = gleaming, and is connected with the Sanscrit arj-una = light and raj-ata = white. In the Teutonic languages we have in German—silber, Swedish—silfver, Danish—sölv, Dutch—zilver, the origin of which is doubtful.

Copper.

While gold and silver have always been precious metals and their use by primitive man restricted to ornaments, the first metal to be used in implements was undoubtedly *copper.* In tracing the records of the past by the help of archæological remains we always find a certain order: first the copper age, then the bronze age and last the iron age (the stone age with its several epochs is naturally older). The oldest known civilization is regarded to be the Sumerian, in which we find copper as "urud," which then became "eru" in the following Babylonian civilization. But the earliest record of copper and copper mines dates back to about 4000 B. C., and tells of the copper mines located on Mount Sinai and worked for the Egyptian king Dyezer of the III dynasty, for there were no copper deposits in Egypt. The hieroglyph for copper was the picture of a melting crucible (Fig. 3), which became later the sign for a metal.

Chronologically follows the great Mycenæan civilization on the Island of Cyprus, 3000–1000 B. C., where beautiful copper implements were made. Cyprus became the distributing center of copper for the Greeks and Romans. The Greeks designated it as χαλκός, κύπριος, chalcos cyprios = Cyprian ore, and the Romans as Aes cyprium or simply cuprum. The beginning of the copper age in northern Europe is placed at about 2500 B. C., while in China it came relatively later, in 2200 B. C. It is interesting to note that we have various evidences for the theory that copper came before iron. So, *e. g.*, the Iliad mentions copper 279 times, iron 23 times. The Odyssee, written much later, has 80 times copper and 29 times iron. Iron was at that time more valuable than copper. Another evidence is the fact that the Greek word for smith = χαλκεύς, chalceus, is derived from copper = χαλκός, chalcos, and not from iron = σιδηρος, sideros.

Iron.

Primitive man used always those things which he found and the fact that the oldest implements of *iron* contain a certain amount of nickel is evidence that the iron supply came at first from meteorites, for no iron ore contains nickel, while all the meteorites consist of an alloy of iron and nickel. Iron tools had a very high value, for the metallurgy of iron developed much later. The earliest known iron tool is the one found in the Pyramid of Kephron and dates back to about 3500 B. C., while some iron pieces in the Black Pyramid of Abusir date from about 3000 B. C. Under the Egyptian king Thethmosis III, at about 1500 B. C., the iron metallurgy in Egypt developed among the priests.

The earliest evidence of iron in China dates back to 1900 B. C., in Greece about 1000 B. C., Central Europe 800 B. C., Denmark, Ireland 100 A. D., northern Russia and Siberia 800 A. D., which shows a gradual and slow geographical spread. The making and the tempering of steel is described by Pliny (23–79 A. D.), while the knowledge of cast iron began to develop in the fourteenth century.

The origin of the name iron is not definitely known, but comes probably from the Latin aes = ore, with the ending -arn, thus Indogermanic * isarn, from which the Teutonic languages develop the names. Thus in Gothic—eisam, Anglo-Saxon—isern, old high German—isarn, and in modern German—eisen, Dutch—yser, Swedish

—iärn, Danish—iern. The Latin ferrum = iron may be connected with the Hebrew barzel, as the Romans became acquainted with the metal through the Phœnicians.

Lead.

The first indications of *lead* are in Egyptian and Assyrian inscriptions. The Greeks knew it as μολύβος, molybos, and the Romans as plumbum. In the Old Testament, the Veda, Avesta, and Iliad we find occasional mention of lead. Dioscorides describes lead oxide (litharge) as μολυβδαινα, molybdaina. The Romanic languages derive their term from the Latin plumbum, *e. g.*, in French plomb, in Spanish plomo.

Tin.

The Egyptian did not recognize *tin*, although a copper-tin alloy was known as early as 1600 B. C., and as a constituent of bronze it is of a very ancient use. The Greeks know it as κασσίτερος, kassiteros, and the Romans regarded it as a variety of lead and called it plumbum album. The Latin stannum meant originally a mixture of lead and silver, but in the fourth century tin was designated by it and the modern terms derived, *e. g.*, Spanish—estaño, Portuguese —estanho, Italian—stagno, French—etain, Dutch—tin, Swedish—tenn, German—zinn.

Antimony.

The next metal to become known to the ancients is *antimony*, for it is claimed that already the Chaldæans at about 1000 B. C. understood the preparing of metallic antimony. Its sulphide was well known in the Orient and used as a cosmetic, especially for darkening the eyebrows, the Greeks calling it, στιμμι stimmi, and the Romans stimmi, stibi, or stibium, from which stibium = antimony is derived. There is some doubt as to the origin of the term antimony, which occurs first in the writings of the Alchemist Geber. Some derive it from the Greek αντι, anti, and μοναχος, monachos, meaning "against the monk," the story being that either monks were poisoned with antimony compounds, or that it was used as a remedy against leprosy, a disease occurring frequently among the monks and hermits. Others derive it from the Greek anti and μονος, monos, alone, as the metal which is opposed to being "alone." Still less plausible is the explanation that it is a contraction of Greek anti

and Latin minium = red lead, because it was used as a substitute for red lead. The first extensive study of antimony and its compounds was made by an alchemist, Basil Valentin, who wrote the famous treatise, "the Triumphal Chariot of Antimony," which reveals a thorough knowledge of the chemistry of antimony.

Mercury.

Cinnabar, found as a mineral, was well known as a pigment to the ancients, but its constituent *mercury* was unknown to the ancient Jews and early Greek writers. Aristotle and Theophrastus (400–300 B. C.) mention in their writings ὑδράργυρος, hydrargyros, from ὕδωρ, hydor, water, and αργυρος, argyros, silver, being prepared by treating cinnabar with vinegar. The Romans know it as hydrargyrum and argentum vivum = "living silver." The alchemists called it mercurius in allusion to the messenger god Mercurius, who with his winged hat and winged sandals was the conception of speed, and mercury as a liquid metal was very speedy in its escape. Paracelsus (1493–1541) used some of its compounds as a remedy and introduced it thus into medicine, though some of his treatments were fatal to the patients. Solid mercury was for the first time prepared by Braune of Petrograd in 1759.

Arsenic.

Like cinnabar so the sulphide of *arsenic* was well known as orpiment (Latin auripigment = gold color). Aristotle mentions it as σανδάρακη, sandarake, and Theophrastus as ἀρσενικόν, arsenikon, which means "the masculine one." It is derived from αρρηνικόν, = the color for man, and comes from ἄρσην, arsen, male (Zend—arshan), because the old Greek painters used the sulphide as the color for the sunburnt faces of man, women's faces being painted white. Among the alchemists Albertus Magnus (1193–1280) was the first one to prepare metallic arsenic. The term is represented in many old and modern languages, *e. g.*, Arabic—zirnakun, Syriac—zarnika, Spanish, Italian—arsenico, German—arsen, French—arsenic, Hungarian—arzen.

(To be continued.)

LOYALTY TO THE COUNTRY AND TO PHARMACY.[1]

By E. G. Eberle, Ph.M.

In formulating my thoughts, which are to follow the title that was chosen in advance of outlining a promised paper for this Association, I present a timely concordant guide which may carry a message and enable me to draw upon parts of it while complying with my promise:

To respect my country, my profession and myself. To be a loyal citizen, to speak of my country with praise and act always as a trustworthy custodian of its good name. To be loyal to pharmacy and speak of its service with sincerity and conviction that the calling is worthy of my attachment and I a trustworthy votary. To be devoted to the cause of pharmacy, lend my best efforts to its uplift and advancement. To promote association work and thereby promote the service of pharmacy. To be a pharmacist deserving of the respect and confidence of those whom I serve. To look upon its service as an opportunity to be seized with joy and made the most of, and not as a painful drudgery to be reluctantly endured. To believe in pharmacy heart and soul, to be optimistic relative to its mission and convey assurance of its importance to those who are served thereby.

"America's most essential attribute to-day is optimism, because the best interests of the nation demand it. A person who at this juncture is not an optimist is a slacker." May we not in a way apply these optigrams to pharmacy: Pharmacy's most essential attribute to-day is optimism, because the best interests of pharmacy demand it. A pharmacist who at this juncture is not an optimist is a slacker. To be an American to-day means more than it ever did; no matter how different our views may be on other subjects, how diverse our occupations may be, as far as citizenship is concerned there must be a unison of thought and action: To be a pharmacist to-day means more than it ever did. No matter how different our views may be relative to the stock and conduct of the drug store, as far as pharmacy is concerned there must be a unison of thought and action. The diverse interests and activities may be considered

[1] Read before the Pennsylvania Pharmaceutical Association at Wilkesbarre, June, 1918.

in the light of disintegrating forces, and the coöperation of them results in centralizing or unifying them. We have people of every nation in our midst, disseminating their thoughts among us, all of which contribute to our greatness so long as the seed of discord is not sown or the better class of citizenship overwhelmed. One test of citizenship is unquestionable loyalty to the country under all circumstances, and particularly under conditions like the present. The quality of citizenship has a relation to the ideals of citizen. Men's ideal is his closest and highest mental associate—his best friend—for it is most potential in moulding his character, and therefore exercises powerful influence in his success and the quality of service he renders. One must believe in the ideal. One's usefulness to humanity is in proportion to his efforts to reach the ideal.

Coöperation is not an academic theory; it is as sound as that of universal brotherhood. We have not established the latter, nor have we successfully mobilized all the industries. The long-drawn conflict of the world has been between unifying forces and disintegrating forces, just as we have in governments and in every other activity, within and without, and we can trace most of our troubles and hindrances to individualism; coalescence is the solution. Competition does not pay in business except as it applies to service, so in the industries incoördination signifies hindrance. To arrive at the highest efficiency there must be specialization, but a linkage is necessary that coördinates the branches concerned for a common service.

The diverse drug interests in a sense may be viewed in the light of disintegrating forces and the coöperation of them results in centralizing or unifying them. We have druggists with different viewpoints, some inclining to what is denominated commercial and others to that which is termed the professional side of their business. There is no more honorable engagement than the conduct of business on the high plane of honor and integrity, and there is no more dishonorable occupation than to pursue professional lines without sincere regard of the obligations assumed. Whether pharmacy is the profit-yielding part of a drug business or not, the thing is to participate loyally and enthusiastically in the efforts to elevate and conform the commercial and professional status of the calling.

Pharmacy of the drug stores bears a relation to the ideals of the pharmacist; they characterize not only the individual pharmacy but have a powerful influence on pharmacy at large and the service ren-

dered by it. Pharmacy is whatever we make it and represents our belief in it. The layman's estimate of pharmacy is based largely upon that which pharmacists exhibit; they are not in position to render judgment anent what pharmacists may think of pharmacy. All the world may be willing to admit that pharmacy once had an enviable reputation, but most of the world will insist that this reputation not only be maintained but improved. It may be advisable to remind the public of the past record of pharmacy, but they are most concerned with its present status and service. This is our opportunity and our duty.

Insular minds will exert less and less influence for the betterment of pharmacy. The men who count most and whose guidance is of greatest benefit are those who can visualize on pharmacy as an important branch of medical service. And likewise the time will come when medical men will recognize the need of more intensive coöperation with pharmacists. There are some medical men who dislike the word interdependence; they proclaim that they are independent and that their profession is not dependent on pharmacy. This attitude has a relation to the doctrine of individualism, and is incompatible with present-day ideas, when the coöperation of all interests is essential; it breaks the chain that links the branches of medicine for most efficient service.

In the present crisis coöperation means the whole-hearted participation in the purpose of the government to assemble and mobilize the scattered units and resources of the nation, and all loyal citizens patriotically join in these undertakings for its success. And it is in this spirit that we recognize the necessity of the utilization of organized pharmacy as an important factor in the efficiency of the military medical department. Without it the service is incomplete. We do not mean to say that neglect will bring disaster, but surely an established and recognized service is not made use of that would contribute greater safety and more assurance of success in the treatment of the sick and wounded.

In trades and professions coöperation is the means whereby the efforts and resources of individuals engaged in the same or closely related activities may be coördinated for enhanced service and profit and the value thereof is determined by sound judgment and honesty of purpose. The thought is applicable to associated work in pharmacy; we must have our state associations, but these have interests in common that should be represented in the House of Delegates

of the American Pharmaceutical Association. The possibilities of such organization for pharmacy have not been fully appreciated, but we do know the great power that has come to the American Medical Association because in its House of Delegates all state medical associations are represented.

The movement for federating the drug industries is also a subject for our earnest consideration. There are common interests in all branches of the drug trade; there are activities that can be developed and great benefits to be derived by coördination and coöperation.

Coöperation is an essential of loyalty, not only an obligation to our country but also to the activities in which we are engaged.

> By mutual action and by mutual aid
> Great deeds are done—associations made.
> The wise new backbone in the wise inspire,
> And one hard worker fans another's fire.

WANTED—THE OLD-FASHIONED PHARMACIST.[1]

By J. W. England, Ph.M.

Under the caption of "Wanted—The Old-Fashioned Doctor," the following editorial has recently appeared in the *Philadelphia Public Ledger:*

As the shortage of doctors continues to make itself manifest in civilian life it is being made clear to the most thoughtless that what the medical schools should turn out in greater numbers and what the country needs is the good, old-fashioned, all-around general practitioner. In many ways the tendency of medical education of recent years toward concentration in the matter of schools and extreme specialization and standardization has not only reduced the number of doctors as a whole, but seriously cut down those who cared for or were trained for general practice. It is now seen this practice was not altogether the wisest of courses. The highest of standards for admission to medical schools, it may be said, should be maintained in these days of advanced sanitation and advanced methods of preventive medicine; but with these high standards, which have had the effect of cutting down the supply of students and therefore of doctors, it would seem as if something should have been done before the war to increase the attractiveness of the

[1] Presented at annual meeting of Pennsylvania Pharmaceutical Association, Wilkesbarre, June, 1918.

medical profession, and, what is more, instead of forcing the issue as to specialists give the general practitioner a dignity and opportunity which for a number of years have been denied him.

As a consequence, the depletion of the specialists, not only the surgical specialists, by the war, has left the medical profession available in civil life scant in numbers and with altogether too few who are indisputably general practitioners and truly understand the "art of healing." For healing is an art, and it depends more largely than many think on individual equation plus the science of medicine as it is obtained in the schools, the hospitals and the daily practice. . . . As it is, if the war continues, the great need of utilizing the general practitioner for all sorts of service from which he is now cut off by the detailed specialization which rules will be pressed home on every one.

The medical educators, however, naturally are not blind to the situation and to some of them what is happening will be viewed as a case of "I told you so." At all events, as all schools and colleges are looking to their methods with a view of determining their practical relation to the output, it would seem as if the medical schools are in need of some genius who will plan for them a system which will turn out more old-fashioned doctors and leave the necessary specialization carried on by relatively small groups of laboratory workers, while the doctors serve the community as a whole and along broad and general lines, applying the hospital and laboratory facts by the bedside, in the home and in the office as occasion calls for.

The shortage of the "good, old-fashioned, all-around general practitioner" is not only quantitative, by reason of fewer medical schools and fewer students, but qualitative, also, by reason of the extreme standardization of the medical sciences and art taught in the schools and the overspecialization of medical practice.

The practice of medicine today is in a state of evolution. The older practitioner has a firm faith in the use of drugs for the treatment of disease. The newer practitioner has little faith in drugs and much concerning preventive medicine.

The scientific exactness of the sciences applied in preventive medicine—bacteriology, immunology, hygiene, sanitation, etc., and the brilliant results they have yielded in conserving human life, have appealed powerfully to the imagination of the medical profession, especially when contrasted with the apparent lack of scientific precision in the use of drugs, which lack, by the way, is more apparent than real.

Many of the medical schools unduly emphasize the importance of preventive medicine and minimize the importance of materia medica and therapeutics, so that therapeutic nihilism has grown apace and drugs are being used, less and less, by the younger men, at least, in the treatment of disease; although it is but fair to add

that some of the most prominent schools and teachers of the day recognize the value of drugs and are staunch advocates of their use.

The indirect result of this trend, however, has been that there is less and less demand by physicians of pharmacists for professional services; and yet many physicians condemn pharmacists for the too largely non-professional character of pharmacy. If the practice of pharmacy in the retail drug store of today is not as professional as it should be, the fault is chiefly with the medical profession by reason of its neglect of materia medica and therapeutics, although the pharmaceutical profession itself is by no means blameless.

As usual, in medical history, the pendulum has swung from one extreme to the other. Formerly, drug-therapeutics was everything in medical practice and preventive medicine a dream; now preventive medicine is everything and drug-therapeutics is nothing, relatively. The truth is, of course, between the two extremes. There is a brilliant future for preventive medicine, but there can be, also, an equally brilliant future for drug-therapeutics. It is most desirable, of course, that every step be taken to prevent disease; but when disease is present, the patient does not care then to know how he got it, or how he can avoid getting it again; what he wants to know is what relief he can get *now*. He is not particularly keen about being "an interesting case" *only* to his physician! He wants something done, being of the opinion of Jacobi, that "those who die, die 100 per cent."

Some one has said that the medical profession has "run after false gods" and "fallen down on its job," that it does not get as successful clinical results as it did when drugs were more generally used (the death rate of pneumonia, for example, twenty-five years ago was 25 per cent.; today it is from 30 to 50 per cent.) and that in consequence, the confidence of the public in physicians has become so weakened that osteopathy, Christian Science, and patent medicines particularly, have obtained their present widespread vogue.

But, whether this is true or not, the fact remains that thousands of years of clinical experience have shown that drugs, rightly used, have real possibilities of usefulness in clinical conditions. It may be that the results gotten cannot always be explained with modern scientific exactitude—the individual drug-reaction in the treatment of disease may be too variable to do so—but this does not justify

the neglect of materia medica and drug-therapeutics shown by many of the medical profession in recent years.

Drugs have positive clinical values, and these should be as accurately determined as possible to the end that the wheat may be separated from the chaff and utilized for the benefit of sick humanity. If empirical therapeutics is anathema from a scientific viewpoint why not develop rational therapeutics, as advocated years ago by Dr. Horatio C. Wood, the ablest therapeutist American medicine has ever produced?

The old-fashioned doctor with his intimate knowledge of the possibilities and limitations of drugs in the treatment of disease is being superseded by the new-fashioned doctor who thinks chiefly in terms of preventive medicine; and unless the medical profession awakens to the very serious dangers that menace it through its neglect of materia medica and drug-therapeutics, with the consequent insufficiency of clinical results and the weakened confidence of the public, the influence and prestige of the medical profession will be seriously imperilled.

The medical profession needs nothing today so much as to be born again in a new faith in the rational use of drugs for the treatment of disease, both to ensure and promote the growth and development of the science and art of medicine and for the better preservation of the health and lives of the people.

And when this is done, then the old-fashioned pharmacy and the old-fashioned pharmacist will again come into their own. God speed the day!

ZINC OXIDE, U. S. P.

By Charles H. LaWall, Ph.M.

Under the title "Lead in Medicinal Zinc Oxide," I contributed a paper to the meeting of the New Jersey State Pharmaceutical Association in 1917, at which time attention was directed to the fact that no U. S. P. zinc oxide was obtainable upon the market and that the blame lay at the pharmacist's door for not refusing to accept the articles labeled "for technical use" supplied on orders for "Zinc Oxide, U. S. P." and for not demanding an article in compliance with the U. S. P. requirements as regards the heavy metal test especially.

Since that time some manufacturers have placed U. S. P. zinc oxide upon the market that complies with the tests in every respect. Hence the relevancy of the title of the present paper.

A statement was made in the former paper that it was difficult to obtain satisfactory results with the U. S. P. heavy metal test when applied to zinc compounds. A number of samples have been examined during the past year and subsequent experience leads to the conclusion that the test for lead in zinc oxide by the present heavy metals test might well be eliminated and replaced by the following:

Add 2 grammes of zinc oxide to 5 mils of distilled water and then add 25 mils of diluted sulphuric acid and heat on the water bath with constant stirring for five minutes. The resulting solution should be colorless and free from opalescence or turbidity (copper and lead).

Add 2 grammes of zinc oxide to 20 mils of distilled water and after stirring well add 5 mils of glacial acetic acid and warm upon the water bath until solution is effected. The addition of 5 drops of potassium chromate T.S. produces no turbidity nor precipitate (lead).

Samples of zinc oxide, U. S. P., found upon the market at the present time will answer both of these tests perfectly and they are much easier to apply and base an opinion upon the results than is the heavy metals test previously referred to.

Considerable correspondence has been carried on with manufacturers of zinc oxide relative to the presence of lead and the amount found. One well-known imported brand which has enjoyed a high reputation for years was found to contain 0.28 per cent. of PbO. The U. S. P. heavy metals test under the most favorable conditions will detect about 0.05 per cent. of PbO. The suggested tests will permit the presence of not more than 0.03 per cent. of PbO and this requirement is being met by several manufacturers at the present time and is a fair requirement under the circumstances and one which should be attained by all manufacturers of zinc oxide.

It may be well to state for the benefit of pharmacists whose products are constantly open to inspection and analysis, with subsequent prosecution and unpleasant publicity when articles are found below the U. S. P. standards, that the tests above described may be easily applied to the zinc oxide separated from the official ointment of zinc oxide. I would suggest, therefore, also that to the text for the latter the following paragraph be added:

The residue from the ignition of 10 grammes of ointment of zinc oxide should comply with the requirements for absence of lead (see zinc oxide).

THE DUTY OF THE EMPLOYER IN THE RECONSTRUCTION OF THE CRIPPLED SOLDIER.

By Douglas C. McMurtrie, Director Red Cross Institute for Crippled and Disabled Men, New York City.

We must count on the return from the front of thousands of crippled soldiers. We must plan to give them on their return the best possible chance for the future.

Dependence cannot be placed on monetary compensation in the form of a pension, for in the past the pension system has proved a distinct failure in so far as constructive ends are involved. The pension has never been enough to support in decency the average disabled soldier, but it has been just large enough to act as an incentive to idleness and semi-dependence on relatives or friends.

The only compensation of real value for physical disability is rehabilitation for self-support. Make a man again capable of earning his own living and the chief burden of his handicap drops away. Occupation is, further, the only means for making him happy and contented.

Soon after the outbreak of hostilities the European countries began the establishment of vocational training schools for the rehabilitation of disabled soldiers. They had both the humanitarian aim of restoring crippled men to the greatest possible degree and the economic aim of sparing the community the burden of unproductivity on the part of thousands of its best citizens. The movement had its inception with Mayor Édouard Herriot, of the city of Lyons, France, who found it difficult to reconcile the desperate need for labor in the factories and munition works while men who had lost an arm or a leg, but were otherwise strong and well, were idling their time in the public squares. He therefore induced the municipal council to open an industrial school for war cripples, which has proved the example and inspiration for hundreds of similar schools since founded throughout France, Italy, Germany, Great Britain, and Canada.

The disability of some crippled soldiers is no bar to returning to their former trade, but the injuries of many disqualify them from pursuing again their past occupation. The schools of training prepare these men for some work in which their physical handicap will not materially interfere with their production.

The education of the adult is made up largely of his working experience. The groundwork of training in his past occupation must under no circumstances be abandoned. The new trade must be related to the former one or be, perhaps, an extension or specialization of it. For example, a man who had done manual work in the building trades may, by instruction in architectural drafting and the interpretation of plans, be fitted for a foreman's job, in which the lack of an arm would not prove of serious handicap. A trainman who had lost a leg might wisely be prepared as a telegrapher, so that he could go back to railroad work, with the practice of which he is already familiar.

Whatever training is given must be thorough, for an adult cannot be sent out to employment on the same basis as a boy apprentice. He must be adequately prepared for the work he is to undertake.

The one-armed soldier is equipped with working appliances which have supplanted the old familiar artificial limb. The new appliances are designed with a practical aim only in view; they vary according to the trade in which the individual is to engage. For example, the appliance for a machinist would be quite different from that with which a wood turner would be provided. Some appliances have attached to the stump a chuck in which various tools or hooks can interchangeably be held. The wearer uses these devices only while at work; for evenings and holidays he is provided with a "dress arm" which is made in imitation of the lost natural member.

An important factor in the success of reëducational work is an early start, so that the disabled man shall have no chance to go out unemployed into the community. In even a short period of exposure to the sentimental sympathy of family and friends, his "will to work" is so broken down that it becomes difficult again to restore him to a stand of independence and ambition. For this reason, therefore, the plan for his future is made at as early a date as his physical condition admits, and training is actually under way before the patient is out of the hospital.

In the readjustment of the crippled soldier to civilian life, his placement in employment is a matter of the greatest moment. In this field the employer has a very definite responsibility.

But the employer's duty is not entirely obvious. It is, on the contrary, almost diametrically opposite to what one might superficially infer it to be. The duty is not to "take care of," from patriotic motives, a given number of disabled men, finding for them any odd jobs which are available, and putting the ex-soldiers in them without much regard to whether they can earn the wages paid or not.

Yet this method is all too common. A local committee of employers will deliberate about as follows: "Here are a dozen crippled soldiers for whom we must find jobs. Jones, you have a large factory; you should be able to take care of six of them. Brown, can you not find places for four of them in your warehouse? And Smith, you ought to place at least a couple in your store."

Such a procedure cannot have other than pernicious results. In the first years of war the spirit of patriotism runs high, but experience has shown that men placed on this basis alone find themselves out of a job after the war has been over several years or, in fact, after it has been in progress for a considerable period of time.

A second weakness in this method is that a man who is patronized by giving him a charity job comes to expect as a right such semi-gratuitous support. Such a situation breaks down rather than builds up character, and makes the man progressively a weaker rather than a stronger member of the community. We must not do our returned men such injury.

The third difficulty is that such a system does not take into account the man's future. Casual placement means employment either in a make-shift job as watchman or elevator operator such as we should certainly not offer our disabled men except as a last resort—or in a job beyond the man, one in which, on the cold-blooded considerations of product and wages, he cannot hold his own. Jobs of the first type have for the worker a future of monotony and discouragement. Jobs of the second type are frequently disastrous, for in them a man, instead of becoming steadily more competent and building up confidence in himself, stands still as regards improvement and loses confidence every day. When he is dropped or goes to some other employment, the job will have had for him no permanent benefit.

Twelve men sent to twelve jobs may all be seriously misplaced, while the same twelve placed with thought and wisdom and differently assigned to the same twelve jobs may be ideally located. If normal workers require expert and careful placement, crippled candidates for employment require it even more.

The positive aspect of the employer's duty is to find for the disabled man a constructive job which he can hold on the basis of competency alone. In such a job he can be self-respecting, be happy, and look forward to a future. This is the definite patriotic duty. It is not so easy of execution as telling a superintendent to take care of four men, but there is infinitely more satisfaction to the employer in the results, and infinitely greater advantage to the employee. And it is entirely practical, even in dealing with seriously disabled men.

A cripple is only debarred by his disability from performing certain operations. In the operations which he can perform, the disabled man will be just as efficient as his non-handicapped colleague, or more so. In the multiplicity of modern industrial processes it is entirely possible to find jobs not requiring the operations from which any given type of cripples are debarred. For such jobs as they can fill the cripple should be given preference.

Thousands of cripples are now holding important jobs in the industrial world. But they are men of exceptional character and initiative and have, in general, made their way in spite of employers rather than because of them. Too many employers are ready to give the cripple alms, but not willing to expend the thought necessary to place him in a suitable job. This attitude has helped to make many cripples dependent. With our new responsibilities to the men disabled in fighting for us, the point of view must certainly be changed. What some cripples have done, other cripples can do—if only given an even chance.

The industrial cripple should be considered as well as the military cripple, for in these days of national demand for the greatest possible output there should not be left idle any men who can be made into productive workers.

With thoughtful placement effort, many men can be employed directly on the basis of their past experience. With the disabled soldiers who profit by the training facilities the government will provide, the task should be even easier.

This, then, constitutes the charge of patriotic duty upon the employer:

To study the jobs under his jurisdiction to determine what ones might be satisfactorily held by cripples. To give the cripples preference for these jobs. To consider thoughtfully the applications of disabled men for employment, bearing in mind the importance of utilizing to as great an extent as possible labor which would other-

wise be unproductive. To do the returned soldier the honor of offering him real employment, rather than proffering him the ignominy of a charity job.

If the employer will do this, it will be a great factor in making the complete elimination of the dependent cripple a real and inspiring possibility.

SOME EXPERIENCES OF A PHARMACIST AS ONE OF THE ENLISTED PERSONNEL OF THE NAVY.

By W. M. Saylor.

I have read the various arguments, published in the May edition of the American Journal of Pharmacy, in favor of establishing a Pharmaceutical Corps in the United States Army.

That the profession of pharmacy receives no consideration and as a profession does not exist in the military services of this country is quite well known, but the reasons for this condition existing are not so well known or at least not easily explained.

Practically every ship in the Navy large enough to carry a crew of say four hundred or five hundred men carries quite a large stock of drugs and among these some of the most toxic drugs known. The dispensary and drug-store rooms may or may not be in charge of a man who has had a pharmaceutical training; though in case a pharmacist is found in the corps, he is usually given "Dispensary" duty.

The pharmaceutical duties of the naval pharmacist (a warrant officer) are only secondary, in case he has any at all, his duty being clerical work.

No special training of any kind, not even a high-school education, is required for entrance into the Hospital Corps of the Navy.

The following are some of the orders I have received on board ship and carried out whenever possible; many times the limited number of drugs in the supply table did not permit me to do so.

1. "Take two smears of each of these men's throats (sometimes four or five men at a time); stain one slide with Loeffler's Methylene Blue, the other by Gram's method and report findings."

2. "Get a specimen of this man's sputum and examine for tubercle bacilli and pneumococci."

Of course the above orders presumed a knowledge of the preparation of the necessary stains as well as a knowledge of the technique of applying them and the ability to examine the finished slide under the microscope.

3. "Examine this specimen of urine for indican."

4. "Examine this specimen of urine chemically for sugar and albumin and microscopically for casts, and report findings."

5. "Here are samples of drinking water, sixteen of them, from the various tanks, and life boats on board: examine them and determine whether or not they are potable."

I was called out at eleven o'clock one night to examine a specimen of drinking water and send a written report to the officer (doctor) of the day. He of course transmitted the report to the commanding officer.

6. "Make a tenth normal volumetric solution of potassium permanganate." This I was unable to do, as none of the necessary standard chemicals for volumetric work were on board the ship, not even a standard sodium carbonate. Then the doctor wanted the solution immediately and it requires some little time for preparation when made according to the ninth revision of the U. S. Pharmacopœia.

Of course all of my work was verified by the doctor, as the work of an enlisted man on subjects of such moment and involving so much scientific knowledge cannot be considered authoritative.

I know of several pharmacists who have enlisted in the Navy and who are doing good work in anything that may come up requiring their professional training.

The following questions now arise:

1. Could just any member of the Hospital Corps have carried out such orders? Certainly not. No doctor in the Navy would ever expect this.

2. Is all such highly necessary work as this always carried out when it presents itself? If so the doctor would have to do it himself unless he could find some one of the hospital corps who was capable of doing it.

I do not wish to say anything reflecting on the men in the hospital corps of the Navy. They are a fine, good-working bunch of men and deserve the rates they hold.

I only wish to suggest that a man who can do the work required in this branch of the Navy and has also had years of both practical

and college training in the sciences and arts, which a pharmacist must know, can be of exceptional value to the service.

I have spoken only concerning some of the duties on board ship and at sea. How much greater must be the necessity for trained pharmacists at a naval hospital where dispensing and laboratory and pharmaceutical, chemical, bacteriological and biological work are indispensable.

Pharmacists have been drafted into the national army as privates and are now being called upon to exercise their knowledge, gained by hard study and the expense of a college training. Is not this practically the same as drafting a profession? No other profession has been made to use their knowledge in this manner without some previous consideration in the way of a commission or better pay.

If the pharmacist is capable of doing such work as that mentioned here is he not also capable and worthy of a rank that will make his work authoritative?

VITAMINES.[1]

By Prof. W. Ramsden.

(*Abstract.*)

It has been discovered during the last twenty years that animals as various as pigeons, fowls, rats, pigs, and man, if fed exclusively on polished rice, develop the disease known as beri-beri, characterized by serious changes in the peripheral nerves, and that a water, or 90 per cent. alcohol, extract of the rice-polishings contains a substance of which very minute quantities prevent or cure the disease.

By careful and laborious experiments with rice and other diets it has been shown that this substance is widely spread in the common foodstuffs and that its presence is essential for life. Attempts to isolate it in a pure state in sufficient quantity for chemical investigation have not hitherto been completely successful, but enough has been ascertained to make certain that it is neither a protein, fat, nor carbohydrate, nor indeed any of the known constituents of plants or animals. It is free from phosphorus, insoluble in absolute alcohol, ether, benzene, acetone, or oils, soluble in water or 90 per

[1] From the *Journal of the Society of Chemical Industry*, February, 1918.

cent. alcohol, and is adsorbed by fullers' earth or animal charcoal. It survives a good deal of cooking at 100° C., but is slowly destroyed at 120°. It is resistant to 5 per cent. sulphuric acid. Funk has proposed for it the name "the anti-beri-beri vitamine" and this term "vitamine," although open to many objections, has been widely adopted for substances of this type. The name "sitacoid," meaning a medicine-like substance associated with food, is suggested by the writer as accurately descriptive and not implying a knowledge of their chemical characters which we do not possess.

Most foodstuffs contain adequate amounts of the anti-beri-beri substance but, it is important to note, white flour, polished rice, and arrowroot, and probably also "corn-flour," and much of what is sold as sago, tapioca, and semolina, contain more. Ordinary white bread doubtless contains a little derived from its yeast, but certainly not enough for health unless supplemented by other foodstuffs. Wheat-bran contains a little, wheat-embryo contains a good deal.

It has also been discovered, thanks mainly to the pioneer researches of Hopkins, Stepp, Osborne and Mendel, and McCollum and his collaborators, that rats and mice require not only the anti-beri-beri substance in their diet, but at least one other vitamine or sitacoid, and in its absence get sore eyes (xerophthalmia) and are unable to grow. It will be convenient to refer to this as the anti-sore-eyes substance (McCollum's fat-soluble A).

As found in animal substances, it is slightly soluble in water, but much more so in oils, ether, and hot alcohol. It is very resistant to ordinary cooking operations, but is slowly destroyed by prolonged exposure to daylight. It has not been identified with any of the chemically known constituents of plants or animals. It is either completely free from phosphorus and nitrogen or, alternatively, it is active in incredibly minute amounts. As found in the higher plants it is insoluble in ether, oil, or hot alcohol. The relations between the plant and the animal anti-sore-eyes substances have not yet been ascertained. Proved to be indispensable for mice and rats, and especially for the growth of the young, there are strong reasons also for suspecting it to be equally indispensable for man. It is present in quantity in yolk of egg, codliver oil, all animal fats investigated (with the remarkable exception of lard), milk, cheese, butter, margarine made from animal fats, green leaves, soya beans, millet, and flax seed. It is absent from lard and all vegetable oils (almond, maize, cottonseed, sunflower seed, linseed, and soya

bean oils) and margarines made from them. It is present, although apparently in small amount only, in the (entire) seed of wheat, oats, maize, hemp, rye, and cottonseed.

There are strong reasons for believing that lack of yet a third vitamine or sitacoid is mainly responsible for the disease known as scurvy. This anti-scorbutic substance is remarkable in that although surviving ordinary cooking operations it usually fails to survive slow drying or long "preservation" of the food in which it is contained. It is present in all fresh vegetables, fruit, or meat. It is rarely or never present in dried vegetables. It is absent or inadequate in amount in dried seeds, but it is present in seeds, *e. g.*, barley, peas, which have just been allowed to germinate (Furst, Weill and Mouriquand, Miss Chick).

McCollum's observation that guinea pigs on a diet of oats do not get scurvy if given laxatives is explicable on the assumption that the anti-scorbutic substance is essential for the normal functioning of the intestine.

The table given below indicates some of the commoner foods in which one or more of the three vitamines have been definitely proved present or absent. The feeding experiments necessary for each such proof are time-consuming and demand very many precautions. Anything like exact comparisons is at present impossible, and the number of plus signs in the table indicates merely the general impression conveyed by the different observers.

	Anti-Beri-beri.	Anti-Xerophthalmia.	Anti-Scurvy.
Egg-yolk	++++	++++	o
Milk (cow's)[2]	+	++	+
Butter	little or none	++++	o
Whole meal wheat flour	++	little or none	o
White wheat flour	o	little or none	o
Potatoes	+		++
Cabbage	++	+++	+++
Dried peas	++	very little	o
Orange juice			++
Dried soya bean, millet, and linseed	++	++	o
Fresh meat and fish	+	+	+
Tinned meat	o		o
Cod-liver oil	o	+++	o
Lard	o	o	o
Margarine:			
from animal fats	o	++	o
from vegetable fats	o	o	o
Yeast	++++	little	o

[2] Milk vitamine-content depends largely on the mother's diet.

There is evidence that unless a nursing mother is obtaining adequate amounts of the first two vitamines in her food the milk she produces is deficient in these bodies. Adults tolerate lack of these substances in food much longer than young growing animals.

It is clear that the facts of which a brief account has been given above are of much importance to this community, and should be widely known.

THE BEHAVIOR OF CERTAIN VITAMINS.[1]

A recent study of one of the dietary essentials of vitamins which McCollum has designated temporarily as "water-soluble B" brings us appreciably nearer to a more precise understanding of these unique substances. Ever since the surprising descriptions of the almost miraculous relief of animals suffering from experimental polyneuritis by the administration of extremely small quantities of substances derived from rice polishings and other sources, the curiosity of both the physiologist and the clinician has been aroused at the possible chemical nature and mode of action of these so-called vitamins. Enough data furnished by competent workers now exist to indicate how essential these as yet unidentified components of the diet are for the physiologic well-being of the individual. Without certain additions, otherwise adequate mixtures of the familiar nutrients, proteins, fats, carbohydrates and inorganic salts will not suffice to induce satisfactory nutrition. These additions or vitamins, are widely distributed in the most diverse natural products. The absence of the dietary essentials results in nutritive decline, and a variety of pathologic consequences which are just beginning to be recognized as indications of the dietary deficiences. McCollum and Simmonds[2] have found that the water-soluble B, the vitamin that averts symptoms of polyneuritis when the diet is otherwise adequate, can be extracted from diverse plant and animal sources by the use of alcohol. This procedure liberates the vitamin, so that it becomes soluble in organic solvents like benzene, with which it cannot be extracted from its original sources. Thus it has been found that the water-soluble B is not extracted directly from beans, wheat germ, or

[1] From the *Journal of the American Medical Association,* April 6, 1918.

[2] McCollum, E. V., and Simmonds, Nina, "A Study of the Dietary Essential, Water-Soluble B, in Relation to its Solubility and Stability Towards Reagents," *Jour. Biol. Chem.,* 1918, 33, 55.

pig kidney by ether, benzene or acetone but is readily extracted in great part by alcohol. After being removed by alcohol, it is shown to be soluble thereupon in benzene, but very slightly soluble in acetone. The probability, McCollum and Simmonds state, that there should be two or more physiologically indispensable substances in what they term water-soluble B, both or all of which should show the same solubility relations with three solvents, is relatively small and lends support to their view that the substance which protects animals against polyneuritis is the only essential complex in the extracts described. In other words, the data support the view that there are no specific substances present in these extracts which protect against such diseases as scurvy, rickets, pellagra and sprue, and tend to confirm their contention that the latter are not due to specific starvation, as is the case with beriberi and xerophthalmia. The tentative exclusion of the hypothesis of a great multiplicity of vitamins marks an advance in the study of these diseases.

BACTERIA AND VITAMINS.[1]

That the food accessory factors now familiarly spoken of as vitamins may have some part to play in relation to the immunity of the body from disease, or its susceptibility to invasion by microörganisms, is suggested by a variety of known facts. One striking illustration is found in the tendency for the development of xerophthalmia when the fat-soluble vitamin, such as occurs in milk fat or butter, egg yolk and cod-liver oil, is missing from the diet. From recent investigations it seems probable that not only animals, but even the higher plants, may derive advantage for their growth and development from substances comparable with the vitamins that facilitate animal well-being and exert their potency even when extremely small amounts of the as yet unidentified compounds are added to the culture medium. Loeb and Northrop,[2] who have succeeded in cultivating flies in the absence of bacteria, have shown that these lower forms also apparently require some accessory substance to facilitate their development. Now we are told that even bacteria cannot thrive without the presence of factors which act in very small

[1] From the *Journal of the American Medical Association*, April 20, 1918.

[2] Loeb, J., and Northrop, J. H., "Nutrition and Evolution," Second Note, *Jour. Biol. Chem.*, 1916, 27, 309.

amounts and are not, by themselves, able to support growth. Lloyd,[3] in England, has called attention to the alleged rôle of vitamins in the growth of the meningococcus, concluding from her investigations that the primary cultivation of this microörganism in vitro is possible only in the presence of certain accessory growth factors present in blood, serum, milk and other animal fluids, and probably also in vegetable tissues. She regards the essential substances as moderately stable toward heat. In this country, Davis[4] has offered further evidence that something comparable with vitamin phenomena may appear in bacterial nutrition. His attention has been directed to the growth of hemophilic bacteria which require hemoglobin for their development. For optimal growth, however, something more seems to be essential, and the added factor, not found in synthetic mediums, is found in foreign bacteria, and in fresh animal and plant tissues. How the substances thus furnished act is quite as obscure as is the answer to the question of their chemical nature. Davis suggests that they may function, in the case of hemophilic bacilli, to render iron more available; and he ventures the further suggestion that the action of vitamins in animals and higher plants may concern or somehow control the metabolism of certain elements like iron, phosphorus, calcium or iodine, as well as possibly the protein metabolism. It is perhaps too early in the period of collecting facts in this field of study and critically evaluating them to indulge in elaborate hypotheses; but the fascinating mystery of the vitamins is penetrating into many avenues of biologic inquiry. Science must guard against undue enthusiasm when so much uncertainty and contradiction still exist.

THE STABILITY OF VITAMINS.[1]

There is a widespread impression that those as yet little understood, but apparently indispensable, components of the diet popularly termed vitamins are easily destroyed by heat. Obviously the establishment of the truth in this respect is a matter of great importance. Most of the foods that enter the diet of man beyond the period of in-

[3] Lloyd, Dorothy, *Jour. Path. and Bacteriol.*, 1916, 21, 113.

[4] Davis, D. J., "Food Accessory Factors (Vitamins) in Bacterial Culture, with Especial Reference to Hemophilic Bacilli," I, *Jour. Infect. Dis.*, 1917, 21, 392.

[1] From the *Journal of the American Medical Association*, April 27, 1918

fancy are subjected to heat in cooking; and at present the practice of food preservation as a part of the conservation movement involves the application of heat. One need only recall the preparation of canned vegetables, tinned meats and milks, and the sterilization of milk by heating, to appreciate a further aspect of the problem.

The statements as to the instability of vitamins toward heat seem, to a large extent at least, to be an outcome of the widely held belief that heated milk is responsible for infantile scurvy, which, in turn, is conceived to be a deficiency disease. As we have pointed out in the past, the etiology of scorbutus is far from being definitely understood, and the bearing of the milk factor in the genesis of the symptoms is still open to new interpretations. The most promising method of ascertaining the truth would seem to consist in studying the effect of heat on sources of vitamin that can be tested in unmistakable ways. One of these is afforded by the ready production of experimental avian polyneuritis, the analogue of human beriberi, which is easily relieved by suitable vitamin products. The results and their proper interpretation are usually clear. In this way several American investigators have shown that the boiling temperature of water is by no means entirely destructive to the antineuritic vitamin, even though heating under pressure may be destructive in its effects.

At the Lister Institution in London, Chick and Hume[2] have renewed the study of the fate of vitamins on heating, employing the antineuritic properties of the wheat embryo and of yeast as test objects. They found that exposure of wheat embryo to a temperature of about 100° C. for two hours resulted in no significant loss in antineuritic "vitamin." If, therefore, it is included in the flour from which bread or biscuit is made, it can be relied on to retain its antineuritic properties after baking. At temperatures in the neighborhood of 120° C., however, there was a swift destruction of antineuritic properties. This fact has an important bearing where diets are largely composed of preserved and canned foods previously sterilized at temperature above 100° C.

There is at present a pronounced difference of opinion as to the nature of scurvy. The classic experimental animal for the study of this condition has been the guinea pig. Holst has found that it will

[2] Chick, Harriette, and Hume, E. Margaret, "The Effect of Exposure to Temperatures at or above 100° C. on the Substance (Vitamin) whose Deficiency in a Diet Causes Polyneuritis in Birds and Beri-Beri in Man," *Proc. Roy. Soc., B,* 1917, 90, 60.

develop the disease in acute form if kept on a diet of cereals with water or sterilized milk. McCollum and his associates are unwilling to admit that scurvy belongs to the deficiency diseases in the sense of being caused by a lack of vitamins in the diet. They associate it rather with the absence of suitable texture or bulk to the food so that the intestinal functions are not appropriately exercised. In the forms of scurvy familiar in human experience, fresh fruits and vegetables are believed to have a pronounced curative virtue. Obviously the facts can be adjusted to a variety of hypotheses. It may be assumed that the curative foods mentioned furnish needed vitamins or that they succeed by altering the alimentary functions in a beneficial way. In any event, Holst reported that the antiscorbutic power of certain fresh foods, notably cabbage, was slightly lessened after exposure to 100° C. for half an hour, but that the deterioration was appreciable after one hour; at from 110° to 120° C. the destruction was rapid and complete. If such evidence is accepted, it would seem as if neither the antineuritic vitamin nor the antiscorbutic property, whatever the latter may be, can be expected to survive in canned or sterilized foods that have been subjected to temperature approaching the damaging limits mentioned.

Chick and Hume,[3] who have studied the distribution among foods, especially those suitable for the rationing of armies, of the substances required for the prevention of beriberi and scurvy, respectively, have come to the conclusion, to quote their own words, that "the antiscorbutic vitamin is present in active living vegetable tissues. It is also present in animal tissue, to a much less degree. Fresh vegetables and fresh fruit juices are the most valuable sources of antiscorbutic vitamin that we possess. All the dried foodstuffs examined, including desiccated vegetables, were more or less deficient in this vitamin." These investigators at the Lister Institute in London have further stated that dry legumes and cereals, though rich in antiberiberi vitamin, are deficient in antiscorbutic vitamin, and afford no protection against scurvy. If these are moistened, however, and allowed to germinate, the antiscorbutic principle is regenerated with the beginnings of active cell life. In view of their own experiments and the existing literature on the subject, Chick

[3] Chick, Harriette, and Hume, C. Margaret, "The Distribution among Foodstuffs (Especially Those Suitable for the Rationing of Armies) of the Substances Required for the Prevention of (A) Beriberi and (B) Scurvy," *Tr. Soc. Tr'p. Med. and Hyg.*, 1917, 10, 141.

and Hume believe that in the case of armies or other populations subsisting largely on canned food, it is imperative to provide an adequate supply of vitamin from outside sources. Their dicta are: To prevent beriberi, the bread or biscuit should be made from wholemeal or germ-containing flour. To prevent scurvy, if a supply of fresh fruit or vegetables is not procurable, germinated legumes should be added to the diet.

We may admit the wisdom of giving due consideration to this carefully planned advice without thereby accepting the hypotheses that have been injected into it. It would be folly, we believe, to proclaim any wholesale condemnation of foods preserved with heat as devoid of antiscorbutic properties until far more evidence is available—evidence obtained without the prejudice of a preconceived theory of etiology. The propaganda for conservation of food by drying must not receive a setback until more conclusive proof of an actual deficiency of any vitamins that they may originally have contained is furnished. Nor must the interesting and valuable vitamin theory be allowed to overshadow completely the fact that calories are necessary for nutrition.

VITAMINE CONTENT OF SOME PHILIPPINE VEGETABLES.[1]

By H. C. Brill and C. Alincastre.

No reliable quantitative methods for the estimation of vitamines have been perfected, and it is probable that in the processes used for their isolation some of them are broken up into simpler substances. Funk (*Biochem. J.*, 1913, 7, 211) determined the vitamine content of milk by estimating the nitrogen of the phosphotungstic acid precipitate by the Kjeldahl method, but subsequently Drummond and Funk (*Biochem. J.*, 1914, 8, 598) found that all the nitrogen of vitamine is not obtained by means of this method, since compounds containing the pyridine ring resist the digestion with sulphuric acid, and approximately only three fourths of the nitrogen of such bodies is so obtained. The present authors base their method upon this property of pyridine derivatives, and proceed as follows:

[1] Abstracted from *Phil. J. of Sci.*, 1917, 11, 127–132 through the *Analyst*, April, 1918.

A portion of the fresh vegetables was dried at a low temperature and very finely ground, and 100 Gm. of the ground foodstuff were exhaustively extracted with methyl alcohol. The alcohol was evaporated at low temperature, and the residue was taken up in water and filtered. The filtrate was acidified with sufficient sulphuric acid to make a concentration of 5 per cent. Phosphotungstic acid was added to this solution to precipitate the antineuritic substance. After standing for from four to eight hours the precipitate was filtered off, washed with 5 per cent. sulphuric acid and finally with alcohol, and dried in a desiccator over sulphuric acid. The nitrogen was estimated in this residue by both the Kjeldahl and Dumas methods.

The values thus found for the vitamine content of Philippine vegetables by this method are usually higher than the results found by Funk for milk (0.001 to 0.003 per cent.), and in the tables given results are recorded for both Kjeldahl and Dumas nitrogen values. The agreement between the two is fairly close when the necessary correction is applied to the Kjeldahl method, allowing for the fact that it is approximately 25 per cent. lower than the Dumas method; the vitamine calculated on some twenty different vegetables from approximately 0.002 to 0.04 per cent.

PRODUCT PATENTS.[1]

By K. P. McElroy.

Once in every so often somebody of a guileless turn of mind asks me what a "product patent" is and it rather peeves me, for one can't define the non-existent. There is not, never was, and likely never will be a "product patent," a patent on a product as a product. The law does not authorize any such patent. We who concern ourselves with patents, like other specialists, have an argot of our own, and our words and phrases are not always what they seem. We are much interested in certain legal relationships between a process and its product; and we chatter considerably of product claims, and even of product patents, when we are really talking about claims for a composition or for an article. And the innocent bystander, taking our vocabulary for his own, goes away

[1] *The Journal of Industrial and Engineering Chemistry*, April, 1918.

with the impression that a patent can be had on some disembodied ghost of a "product"; and then he comes around and bothers me with his mental nebulosities.

The statute under which we work says nothing about a product, but it does define as patentable "any new and useful art, machine, manufacture or composition of matter." Four statutory classes are established and anything patentable must be included in one of these four classes. An "art" is a process or method: a way of doing things; and it always results in a product. This product may be a machine or a manufacture or a composition of matter. It is not patentable unless it is one of the three. Conversely, any machine, or any manufacture or any composition of matter is a product; it is a product of some "art." A process may be novel and the product old, as in a new way of making flapjacks; or both the process and the product may be new. In the latter event the process and the product may be, and usually are, the result of the same mental inventive act; but since they are in separate statutory classes they are, legally, different inventions and must be separately patented; either as different claims in the same patent or as claims in separate patents—the product, of course, being claimed as what it is, as a machine or a manufacture or a composition. Being separate inventions, each must stand on its own legs; and the patentability of the one is in no way affected by the patentability of the other. No matter whether the product is a machine, or an article, or a composition, to be patentable it must be novel in and of itself, and irrespective of any novelty in the process by which it is produced. A composition may be a mechanical mixture or a chemical compound; and it may be novel because things are brought together which were never brought together before, or because they are assembled in a new way (as in a coated granule) or because, though old in make-up, the composition is in a new condition or state; because it has some different form, or characteristic, or property. It does not matter wherein the novelty resides as long as the composition is new and useful. But if it is new, then the novelty must be capable of being pointed out in some way; there must be a test or a characteristic which can be utilized to show that the alleged new composition is indeed new; it may be because it is pink, or is soluble in alcohol, or has a particular melting point or almost anything. If there is no test and no characteristic which will differentiate it from an old thing which the public has the right to use, then it is the same as the

old thing. As a matter of common sense, if the new thing cannot be differentiated from the old thing then there is no difference. And it cannot be made different by talking about its past history; by reciting differences in the process by which it is made. That particular experiment in patent law was made by the Badische at the time of the alizarine synthesis when it claimed "artificial" alizarine as a new composition. The Supreme Court remarked, in effect (Cochrane *vs.* Badische, 111 U. S. 293), that if the new artificial alizarine was exactly the same thing as the old natural alizarine then it was exactly the same thing and calling it "artificial" did not make it different. Of course, sometimes we have to characterize substances by adjectives which look a little process-y because they happen also to be past preterits of verbs, as in talking of a boiled ham or a fried egg or wrought iron, but this does not militate against the general proposition that a thing to be patentable must be differentiated from old things by stating its properties or its characteristics; and that it must be new in itself and not new because of the process by which it was made, *i. e.*, it is not made novel by being a "product."

I regret to say that the nebulous-minded gentlemen with their misconception of "product patents," instead of merely infesting my office, are getting into print and into Congress. And in this there is a certain danger. Mrs. Malaprop was a very pleasant lady; but it was not safe to entrust any business to her. In the present mood of Congress and the people, a proposition to revise the multiplication table, if backed by a good patriotic showing, might slip through. And these gentry wish to abolish "product patents," feeling in some vague way that this will hurt Germany and help us. I do not see how it will do either; but I am somewhat hampered by my inability to grasp exactly what they mean by a "product patent" anyway. If they mean "product" in its legitimate ordinary sense, then the proposition is an absurdity because it is to abolish all patents save patents on processes. For everything that man can make is a product, and it is a product of a process of making: perhaps a patentable process and perhaps an unpatentable one, but still a process.

However, being something of a mind-reader, albeit my education in this line was somewhat neglected, I surmise that what is actually meant is the abolition of patents on the products of really-and-truly chemical processes. If this be so, it leaves intact two more of our statutory classes since a machine and a manufacture are commonly

products of mechanical or physical methods; but it makes the fourth class, the composition of matter, look like the remnants of the shell-shot cathedral at Rheims, with patentability hanging on by an eye-lash. It is not abolished—not all of it; just most of it. Some compositions will be patentable and some not—those whose pedigree is in any way tainted with the "chemical." A little chemistry will damn a thing quite as effectually as a great deal since courts will not draw distinctions between much and little, that being purely a "question of degree." The alibi of the guiltless inventor would have to be absolute, and there might be some difficulty of proving it in the absence of any universally accepted definition of "chemical." At present neither I nor anybody else can write an impeccable definition of the word, one which would stand fire in court. I do not even know, for example, whether dissolving sugar in water is a "chemical" process.

Shifting the anathema to "chemical compound" does not help any, since if a chemical compound is something resulting from chemical action (which is as good a definition as any) we come out the same hole we went in, with the additional burden of defining a "compound." In a general way I know what a compound is; we all do. It is a body composed of two or more elements united in definite proportions, which, however, is just as true of type metal as of aniline; or, for that matter, of any good uniform grade of cast iron.

I fear me that any attempt to sort out the chemical goats from the physical sheep in the composition of matter class would prove like the task of hunting polar bears in purgatory—"apt to be arduous in detail and disappointing in result." There are too many hybrids, goatish sheep and sheepish goats. It would be simpler to abolish the whole class at one fell whack. But I do not understand anybody wants to do this. So far as I understand, the chemist is the only chap it is meant to ostracize; and even he may escape if he does not have intelligence to know what is happening when he stews two things together.

Despite the present popularity of class legislation, being a hide-bound Republican I do not like it; and as a chemist I object to being the class if the legislation is discriminatory against me. To deprive the chemist of his reward for his labor by taking away his "product" claim (whatever that "product" claim may be) is the same to him as depriving the machinist of his claim to his machine or the weaver

to his new article in the way of a fabric. It is not good equity; and moreover it is not good sense. The object of the patent laws is to promote the progress of science and the useful arts, and that they have fulfilled their mission is beyond a peradventure. Why stop now and stop in a single science? For 125 years (to be exact, since February 21, 1793) the chemist has been as much entitled to look forward for reward for what he did as anybody else; he read his title just as clear as did the machinist. Maybe I am biased, and very likely I am, but I can't, for the life of me, see wherein there is any legal or equitable difference between the standing of the chap who puts together an alkyl radical and an aryl radical to make a new drug or a new dye and the man who puts together levers and keys to make a new typewriter. That the product of one is sold in a bottle and the product of the other in a box is not material. Any argument that seeks to discriminate between them is as lopsided as a crane; and I don't like being on the wrong side of the lop. It is at least as much an object to the public to encourage the chemist by patents as it is to encourage the machinist. Both are human and, commonly, poor, and neither is going to strain his ingenuity working nights unless he sees a patent ahead.

Running through all this "product patent" talk, like a rotten streak in a mushy banana, is the idea that the chemist who creates a new drug or dye that becomes a public necessity as soon as its creation and existence are known to the public is guilty of creating public necessities to his own profit, and he ought to be discouraged; or if he won't be, then he should not be allowed to make the profit—which sounds like a curious piece of mental perversion, worthy of the gentleman who habitually stood on his head to peel the apple dumplings; but I am not gilding the lily any in reproducing it—far from it; I am merely condensing and Englishing certain actual arguments which have been made.

WASHINGTON, D. C.,
February 18, 1918.

EXAMINATION OF AMERICAN-MADE ACETYLSALICYLIC ACID.[1]

By Paul Nicholas Leech.

At the request of the Council on Pharmacy and Chemistry, the A. M. A. Chemical Laboratory has undertaken examinations of American-made synthetic drugs. The most extensively used synthetic is acetylsalicylic acid and hence an investigation of this product was deemed expedient.

For seventeen years acetylsalicylic acid was protected by a United States Patent (the proprietors were not give a patent in other countries) and sold under the name "Aspirin." In February, 1917, the patent expired, and since then a number of firms have engaged in the manufacture of acetylsalicylic acid, selling it either as such or as aspirin, modified, of course, by a distinctive firm designation. During this period the former manufacturers (The Bayer Co., New York, in past years called Farbenfabriken of Elberfeld Co., New York) have been extensively advertising, both to physicians and the public, the alleged superior qualities of their product. The chemical examination, therefore, was concerned chiefly with tests of purity, and the comparison of the American brands with the formerly patented product.

In European countries, acetylsalicylic acid[2] is described in the various pharmacopœias as a condensation product of acetic anhydride or acetyl chloride with salicylic acid (*o*-hydroxybenzoic acid). Generally the test of identification is hydrolysis of acetylsalicylic acid and qualitative tests for acetic acid and salicylic acid. For purposes of purity the requirements are essentially that the specimen should have a certain melting point, should show absence of salicylic acid by means of ferric chloride (the manipulations for the tests are variously described) and leave no appreciable ash. The two tests of purity most generally employed, however, are the melting point and the reaction with ferric chloride.

[1] *The Journal of Industrial and Engineering Chemistry*, April, 1918.

[2] Unfortunately, the non-descriptive name "aspirin" has been used extensively in European literature, and has even gotten into European pharmacopœias, instead of the scientific name "acetylsalicylic acid."

MELTING POINT.—The melting point of acetylsalicylic acid has been given at various temperatures from 118° to 137° C.;[3] the *British Pharmacopœia* describes the melting point at 133° to 135° C.; the *German Pharmacopœia* "about 135° C."; the *French Pharmacopœia* at 135° C.; *New and Nonofficial Remedies,* 1917, 134–136°C. The Bayer Company, in the patent trial at Chicago a number of years ago, gave among the "four infallible tests" a melting point of "about 135° C." Several men have carefully determined the melting point in recent years. Emery and Wright[4] in 1912 found that "Aspirin, Bayer" melted at 130.5–131° C. In France, François[5] has determined the melting point of pure acetylsalicylic acid, which, according to his method, is 132° C. When various samples of acetylsalicylic acid were examined in this laboratory, it was found that the melting point of none was as high as that described in *New and Nonofficial Remedies* or the British, French, or German pharmacopœias when taken according to the general method of the *U. S. Pharmacopœia,* vol. 9, p. 596. On critical observation, it may be seen that the melting point of acetylsalicylic acid is preceded and accompanied by decomposition. If the sample in the melting tube is heated from the original room temperature of the bath to 120° C., the temperature of melting will be lower than if the bath is first heated to 120° C. and the melting-point tube then placed in the bath.[6] Thus the melting point of acetylsalicylic acid, like so many organic compounds which decompose and do not melt sharply, is unsatisfactory and cannot be taken as an "infallible test" of purity, especially when determined by different operators who do not give their method in detail. After making a large number of melting-point determinations of acetylsalicylic acid, alone and in parallel with other operators, it was decided to use the method described in

[3] For reference to older literature see Beilstein, II, 1496 (889).

[4] "The Melting Temperature of Aspirin and Salicylic Acid Mixtures," *Proc. Assoc. Off. Agr. Chem.,* 1912; Bureau of Chemistry, Department of Agriculture, *Bull.* 162.

[5] "Assay of Aspirin," *J. pharm. Chim.,* 15 (1917), No. 7, 213.

[6] Similar observations were made by Emery and Wright, who state: "An accurate determination of the melting temperature in this way (the rate of heating was such as to give a rise in temperature of about 1° per minute) is rendered difficult by the fact that 'aspirin' decomposes on heating, as evidenced in the depression of the melting temperature of the pure substance of about 1° for every five minutes' heating just below its melting temperature."

the *U. S. Pharmacopœia* modified by first heating the bath to 120° C. before attaching the melting-point tube to the thermometer.

The melting point of purified acetylsalicylic acid was found to be 131.5–132.5° C. (corr.).[7] With the exception of one specimen, which was obviously impure, the various specimens examined melted between 128° and 133° C. as may be seen in the accompanying table. It would appear that this range of melting points would be more acceptable and reliable than the melting points described in various standards.

Presence or Absence of Free Salicylic Acid.—It is generally conceded that the presence of salicylic acid in amounts more than traces is deleterious. Furthermore, the mount of salicylic acid is a good index of the purity of the acetylsalicyclic acid, because the test is so delicate that, under favorable conditions, mere traces may be determined and, as a rule, the better the product, the less the amount of free salicylic acid.

The tests appearing in various pharmacopœias for salicylic acid as an impurity in acetylsalicylic acid do not give concordant results, different workers interpreting the results differently, nor are they detailed in such a manner as to yield maximum delicacy.

After experimentation, it was decided to establish a "limit" test of approximately 0.1 per cent. free salicylic acid, when carried out according to the following method:

0.1 G. of the substance was placed in a dry colorimeter tube and 1 Cc. of alcohol,[8] previously distilled over NaOH, was added. After the acetylsalicylic acid had dissolved, 48 Cc. of water and 1 Cc. of fresh 0.1 per cent. ferric chloride ($FeCl_3 \cdot 6H_2O$) solution were added. At the same time a control was run by treating 1 Cc. of a "standard" salicylate solution the same as above.[9] If within two minutes the color given by the acetylsalicylic acid is not more intense than the color given by the "standard," the presence of not more than 0.1 per cent. free salicylic acid[10] is proved.

[7] Isolated crystals attached to the walls of the melting-point tube, apart from the bulk of acetylsalicylic acid, melted at a lower temperature.

[8] An excess of alcohol destroys or lessens the color when only a very minute amount of salicylic acid is present.

[9] The control should be made each time as standing in the air changes its tinctorial power.

[10] The presence of pure acetylsalicylic acid does not seem to affect the iron (Fe^{+++}) salicylic acid coloration. The small amount of acetic acid was added to the sodium salicylate control solution (1) to simulate an acidity approximating the acidity of the acetylsalicylic acid, and (2) since

The solutions used were prepared as follows:

Redistilled alcohol was treated with a small amount of sodium hydroxide for 24 hours, then again distilled.

The color standard was made by dissolving 0.116 G. of dried sodium salicylate in water, adding 1 minim of glacial acetic acid, and making up to 1,000 Cc. Each Cc. represents 0.1 Mg. of salicylic acid.[11]

The ferric chloride solution was made by diluting 1 Cc. ferric chloride ($FeCl_3 \cdot 6H_2O$) test solution U. S. P. with 99 Cc. of water. The diluted solution must be freshly prepared each day.

With one exception, all of the commercial specimens examined responded satisfactorily to the above test showing less than 1 part salicylic acid in 1,000 parts acetylsalicylic acid. The individual results are given in the accompanying table.

OTHER TESTS.—*New and Nonofficial Remedies,* 1917, requires that acetylsalicylic acid shall form a clear solution with warm sodium carbonate solution; that sulphates, chlorides and heavy metals shall be absent; that 0.5 Gm. shall leave no weighable ash. All the brands reported in this paper complied with these requirements.

So far there has been no satisfactory quantitative estimation of acetylsalicylic acid. True, various methods have been proposed, but they are objectionable. It was thought that hydrolysis of acetylsalicylic acid and then titrating the solution by comparing the color formed by ferric chloride with that of a standard control might yield interesting results, providing that the conditions were alike. For this purpose 1 Gm. of acetylsalicylic acid was dissolved in 10 Cc. of alcohol and diluted to 1,000 Cc. The solution was then heated at 98–100° C. for 2 hours, allowing the alcohol to evaporate, then allowed to stand at room temperature (22° C.) for 22 hours. After adding water sufficient to make 1,000 Cc., it was compared colorimetrically for salicylic acid strength. The amount of hydrolysis varied so with different samples under the same conditions that it was realized that an approximate assay by this method was unreliable. If the assay were made under more exact conditions, quan-

acetylsalicylic acid gives by hydrolysis both acetic acid and salicylic acid, it was thought advisable to add acetic acid to the standard. If there is any free acetic acid in a sample of acetylsalicylic acid containing salicylic acid (which I believe is generally the case when salicylic acid is present) then it would modify the color given by the same amount of salicylic acid alone. For this reason it was thought to be more comparable to have the standard contain a slight amount of acetic acid.

[11] This standard is somewhat similar to the one proposed by T. W. Thoburn and Paul J. Hanzlik, *J. Biol. Chem.*, 23, 175.

MELTING POINT AND SALICYLIC ACID DETERMINATIONS.

Brand.	Melting Point Corrected.	Free Salicylic Acid Colorimetrically.
Acetylsalicylic acid, P. W. R.[12]	130.0–131.0°	Colored, but showing less than 0.1 per cent.
Acetylsalicylic acid, Millikin[13]	130.0–131.0°	No color.
Acetylsalicylic acid, Millikin[13] 5-grain capsules.....	129.0–130.0°	No color.
Acetylsalicylic acid, Millikin[12] 5-grain capsules[14].....	128.0–129.0° (*a*) 125.5–126.5° (*b*)	Colored, but showing less than 0.1 per cent. (*a*). Considerably more than 0.1 per cent. (*b*).
Acetylsalicylic acid, Squibb[13]..	131.0–132.0°	No color.
Acetylsalicylic acid (Aspirin),[12] Monsanto	131.0–132.0°	No color.
Acetylsalicylic acid, M. C. W.[12]	130.5–131.5°	Colored, but showing less than 0.1 per cent.
Acetylsalicylic acid, M. C. W.[12]	131.5–132.5°	Colored, but showing less than 0.1 per cent.
Acetylsalicylic acid, M. C. W.[12]	131.0–132.0°	Colored, but showing less than 0.1 per cent.
Aspirin, Bayer[12] (before patent expired)	131.5–132.5°	No color.
Aspirin, Bayer[12,15] (after patent expired)	128.5–129.5°	Colored, but showing less than 0.1 per cent.
Aspirin, Bayer[12,15] (after patent expired)	129.5–130.5°	Colored, but showing less than 0.1 per cent.
Aspirin, Lehn and Fink[13].....	130.5–131.5°	0.1 per cent.
Aspirin, Lehn and Fink[13].....	130.5–131.5°	Colored, but showing less than 0.1 per cent.
Aspirin, Lehn and Fink[12].....	131.0–132.0°	Colored, but showing less than 0.1 per cent.

titative comparisons might be possible. In one experiment, after 60 days the hydrolysis of the acetylsalicylic acid was 61 per cent., which is in rough agreement with the work of Tsaklatos and Horsh.[16]

[12] Obtained on the open market.

[13] Obtained from manufacturer.

[14] One third of the capsules (*a*) contained a white powder; two thirds of the capsules (*b*) contained a pink powder having strong odor of acetic acid and not complying with the tests.

[15] Not described in "New Nonofficial Remedies"; the other products are.

[16] *Apoth. Ztg.*, 1915, p 247; *Bull soc. chim.*, 17 (1915), 401. "Studies of the decomposition of aspirin determined by titrametric methods and by conductivity measurements indicate that the reaction is exceedingly complex," T. and H., *Chem. Abs.*, 10, 591.

DISCUSSION.—Apart from the proposed revision of the standards for the melting point and limit of salicylic acid in acetylsalicylic acid, the examination shows that there is no appreciable difference between the various brands of acetylsalicylic acid examined, all of them with one exception (acetylsalicylic acid, Millikin, 5-grain capsules, purchased on the open market) complying with the tests described in this paper. *The Journal of the American Medical Association,* in past years, has protested repeatedly against the monopoly given to the Bayer Company for their "Aspirin," contending that acetylsalicylic acid (aspirin) was not new, and that "Aspirin, Bayer" was simply a good brand of acetylsalicylic acid which could be bought in foreign countries at much lower prices than here. Although the patent in the United States has expired, "Aspirin, Bayer" is still being retailed at higher prices than other products which are now enjoying the privilege of American manufacture.

Mr. Paul Bakewell,[17] in an opinion answering the warning circular of the Bayer Co. in reference to the use of the word "aspirin" by firms other than Bayer, argues very ably that acetylsalicylic acid, before the patent was granted, meant the impure substance which was not used therapeutically, while "aspirin" was designated as the improved product (a new article of manufacture, the particular acetylsalicylic acid made under the Hoffman patent) and "is the substance now known in pharmacy as aspirin" (statement made by an officer of the Farbenfabriken of Elberfeld Co. in U. S. Circuit Court, 1909). The products reported in this paper are (with the one exception) the same as described in the Hoffman patent, and, in the sense of Mr. Bakewell's argument, are "aspirin." However, it would seem better if the name acetylsalicylic acid, instead of aspirin, were used, especially by physicians in their prescriptions because (1) it is a generic, scientific name; (2) "Aspirin, Bayer" is sold at higher prices than other products, whereas chemically equivalent products sold under the descriptive name may be purchased at a lower price. Finally, the manufacture of acetylsalicylic acid in this country is another example of the fact that American chemists can produce the drug synthetics, and at the same time make products as good as, if not better than, those of German origin.

[17] "In the Matter of Aspirin. Answer to the warning circular of the Bayer Co. of June 1, 1917," by Mr. Paul Bakewell, Monsanto Chemical Works.

I express my appreciation to Dr. W. A. Puckner for his kind interest.

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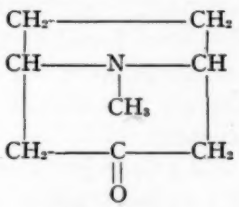
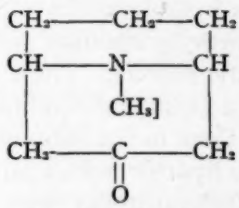
ANALOGUES OF ATROPINE AND HOMATROPINE.[1]

BY LOUIS F. WERNER.

The alkamine tropine, one of the hydrolysis products of atropine, is changed upon oxidation to the ketone tropinone. This ketone is closely related to another ketone known as pseudopelletierine, which occurs naturally in the bark of the pomegranate tree. The relationship between the two is shown by the following structural formulas:



Tropinone



Pseudopelletierine

As can be readily seen, pseudopelletierine differs from tropinone in that it has one carbon atom and two hydrogen atoms more than tropinone.

Tropinone upon reduction is converted into two stereoisomeric alcohols. Upon being reduced electrolytically, or with concentrated hydriodic acid and zinc dust, it is reduced to tropine, but if reduced with sodium and alcohol it yields pseudotropine, a stereoisomer of tropine. These two stereoisomers have different physical properties, and the esters of these alcohols with the hydroxy acids have different physiological properties.

Pseudopelletierine upon reduction also gives two stereoisomeric compounds. Ciamician and Silber[2] found that an alkamine was formed upon reducing pseudopelletierine with alcohol and sodium, which they named methylgranatoline. The author found that a

[1] From the *Journal of the American Chemical Society*, April, 1918.

[2] *Ber.*, 26, 2740 (1893).

stereoisomer is formed by reducing pseudopelletierine with concentrated hydriodic acid and zinc dust, which may therefore be called iso-methylgranatoline. These two isomers have different physical properties, as is the case of the two reduction products of tropinone.

As was stated, an important difference in the properties of the reduction products of tropinone lies in the different physiological activities of the esters of the hydroxy acids with these alcohols. Thus the tropic acid ester (atropine), and the mandelic acid ester (homatropine) of tropine have strong mydriatic power, whereas the tropic acid esters and the mandelic acid ester of pseudotropine are devoid of such properties.

The object of the work undertaken was: To prepare the second reduction product of pseudopelletierine which was theoretically possible, and then to determine any difference in the physiological activities of the tropic acid and mandelic acid esters of these two stereoisomers.

The hydrobromides of the mandelic acid and tropic acid esters of isomethylgranatoline were prepared, and were found to have no mydriatic powers. These two artificial alkaloids were not obtainable in a crystalline condition, it being necessary to isolate them, and purify them in the form of their hydrobromides.

The hydrobromides of the mandelic acid and tropic acid esters of methylgranatoline were also prepared, and were found to have strong mydriatic properties. The hydrobromide of the tropic acid ester was obtained as a crystalline powder, but the hydrobromide of the mandelic acid ester was obtained as a syrup only.

From the viewpoint of physiological activity alone, tropine and methylgranatoline should constitute one type of stereoisomer, that is, the type whose hydroxy acid esters have mydriatic power, whereas pseudotropine and iso-methylgranatoline are another type of isomer whose hydroxy acid esters are lacking in mydriatic powers.

From the standpoint of physical properties we would predict different results from those found above, as we would naturally group tropine (m. p. 63°) and iso-methylgranatoline (m. p. 65°) together and pseudotropine (m. p. 108°) and methylgranatoline (m. p. 100°) together. From the analogy in the methods of preparation of tropine and iso-methylgranatoline, and of pseudotropine and methylgranatoline we would classify these compounds into these two groups also. Thus methylgranatoline is prepared by reducing pseu-

dopelletierine with alcohol and sodium, and pseudotropine is prepared from the corresponding ketone tropinone in analogous manner: iso-methylgranatoline and tropine are both prepared from the corresponding ketones by reduction with zinc dust and hydriodic acid. These results show the uncertainty of associating similarity of chemical and physical properties of compounds with similarity in physiological behavior.

Experimental.

Preparation of Methylgranatoline.—The method used by Ciamician and Silber,[3] slightly modified, was followed. Ten Gm. of pseudopelletierine were dissolved in 200 Cc. of ethyl alcohol, and metallic sodium added until no more would dissolve, the reaction being carried out in a flask heated by a metal bath. Water was then added, and the alcohol distilled off, and the aqueous alkaline residue made acid with hydrochloric acid. This acid solution was then saturated with sodium bicarbonate, and the unchanged pseudopelletierine removed by shaking out with chloroform. The solution was then made strongly alkaline with sodium hydroxide solution, and the methylgranatoline shaken out with chloroform. Upon drying the chloroform solution over anhydrous sodium sulphate, the methylgranatoline was obtained as a crystalline solid upon distilling off the chloroform. Upon recrystallizing from petroleum ether, the pure compound is secured, melting at 100° (uncorr.).

Preparation of Iso-methylgranatoline.—The method used was analogous to that used by Willstaetter[4] in reducing topinone to tropine. Ten Gm. of pseudopelletierine were dissolved in 120 Gm. of conc. hydriodic acid (sp. gr., 1.96), and was then cooled to 0°. Twenty Gm. of zinc dust were then added, stirring constantly, and the temperature was not allowed to rise above 0°. The reaction required about two hours. The mixture was allowed to stand for 24 hours, and then an excess of sodium hydroxide solution added, and the mixture shaken out with chloroform. This chloroform solution contained both pseudopelletierine and the new alcohol. In order to separate the two, the chloroform solution was shaken out with an excess of dil. hydrochloric acid, and after separating from the chloroform, the acid solution was saturated with sodium bicarbon-

[3] *Ber.*, 26, 2740 (1893).
[4] *Ibid.*, 33, 1174 (1900).

ate. This solution was then shaken out with chloroform to remove the pseudopelletierine, and then made strongly alkaline with sodium hydroxide solution, and the iso-methylgranatoline shaken out with chloroform. After being dried over anhydrous sodium sulphate, the alkamine is obtained as a crystalline residue upon removing the chloroform. It was then recrystallized from petroleum ether. The base is readily soluble in water, alcohol, and chloroform, but less soluble in petroleum ether. M. p. 65° (uncorr.).

Subst., 0.2515; N, 20.25 Cc. at 761 Mm. and 21°; collected over 30 per cent. KOH solution.

Calc. for $C_9H_{17}NO$: N, 9.032 per cent. Found: 9.310 per cent.

Preparation of the Hydrobromide of Tropic Acid Ester of Iso-methylgranatoline.—Three Gm. of iso-methylgranatoline and 3 Gm. of tropic acid were dissolved in 10 per cent. hydrochloric acid, and the mixture heated for 70 hours on a water bath, the acid being replaced from time to time as it evaporated. The mixture was then diluted with water, and the excess tropic acid removed by shaking out with ether. Ammonia in excess was then added to the aqueous solution, and the ester shaken out with a little chloroform. The chloroform solution was extracted then with dilute hydrobromic acid, avoiding an excess. This aqueous solution of the hydrobromide was evaporated to dryness in a vacuum desiccator over conc. sulphuric acid. The dry residue was then recrystallized from absolute ethyl alcohol. It was found necessary to repeat the recrystallization several times to completely remove all ammonium bromide. The product so obtained was a white crystalline powder, turning yellow upon prolonged exposure to the light. It is soluble in water or hot alcohol, less so in cold alcohol. M. p. 233° (uncorr.).

Subst., 0.3909; N, 13.20 Cc. at 757 Mm. and 26°; collected over 30 per cent. KOH solution.

Calc. for $C_{18}H_{26}NO_3Br$: N, 3.64 per cent. Found: 3.76 per cent.

Preparation of the Hydrobromide of the Mandelic Acid Ester of Iso-methylgranatoline.—Three Gm. of iso-methylgranatoline and 3 Gm. of mandelic acid were dissolved in 10 per cent. hydrochloric acid, and were heated for 70 hours in an evaporating dish upon a water bath. The hydrochloric acid which evaporated was replaced, from time to time, by the addition of new acid. Only sufficient acid was added to keep all the reacting products in solution. At the end of the time stated, the reaction mass was diluted with a little water,

and the excess mandelic acid removed by shaking out with ether. The alkaloid was liberated by adding ammonia water in excess and was then taken up with a little chloroform. The hydrobromide was secured from this chloroform solution by shaking out with dil. hydrobromic acid, and evaporating the aqueous solution in a vacuum desiccator over sulphuric acid. The pure hydrobromide is secured by recrystallizing the crude salt from absolute alcohol. M. p. 229° (uncorr.). The salt is readily soluble in water or hot alcohol, slightly soluble in cold alcohol.

Subst., 0.4155; N, 14.50 Cc. at 763 Mm. and 25°; collected over 30 per cent. KOH solution.

Calc. for $C_{17}H_{24}NO_3Br$: N, 3.78 per cent. Found: 3.93 per cent.

Preparation of the Hydrobromide of the Tropic Acid Ester of Methylgranatoline.—Four Gm. of methylgranatoline and 4 Gm. of tropic acid were heated for 70 hours in an evaporating dish on a water bath with 0.25 per cent. hydrochloric acid. Sufficient acid was added from time to time to keep all the reacting substances in solution. At the end of this time the mixture was acidified with conc. hydrochloric acid, and the unchanged tropic acid removed with ether. The aqueous solution was then made alkaline with ammonia water, and the base taken up with chloroform. The hydrobromide was formed by extracting the alkaloid from the chloroform by shaking out with dilute hydrobromic acid. Upon evaporating this aqueous solution in a vacuum desiccator over sulphuric acid, the crude hydrobromide was secured, which was purified by recrystallization from absolute alcohol. M. p. 220° (uncorr.). The salt is readily soluble in water and hot alcohol, slightly soluble in cold alcohol.

Subst., 0.4209; N, 14.10 Cc. at 759 Mm. and 20°; collected over 30 per cent. KOH solution.

Calc. for $C_{18}H_{26}NO_3Br$: N, 3.64 per cent. Found: 3.84 per cent.

Preparation of the Hydrobromide of the Mandelic Acid Ester of Methylgranatoline.—This compound was made by heating 4 Gm. of mandelic acid and 4 Gm. of methylgranatoline with 0.25 per cent. hydrochloric acid in sufficient quantity to keep all the reacting substances in solution. After heating for 70 hours, the mixture was acidified with hydrochloric acid, and excess mandelic acid removed by shaking out with ether. The aqueous solution was then made alkaline with ammonia water, and the ester shaken out with chloro-

form. The hydrobromide was secured as a viscous syrup upon extracting this chloform solution with dil. hydrobromic acid, and evaporating *in vacuo* over sulphuric acid. The sulphate and the hydrochloride were also made, but these also were obtained as syrups only. No analysis was attempted of these viscous products.

Conclusion.

The results of the work show that, analogous to tropinone, pseudopelletierine gave two stereoisomers upon reduction. Similar to the two isomers secured by the reduction of tropinone, one of these isomers when converted to the tropic or mandelic acid ester had no mydriatic properties, whereas the tropic and mandelic acid esters of the other had strong mydriatic effects. Use of the physical properties and methods of formation of these isomers was shown to be unreliable as a method of predicting their probable physiological effects.

The author wishes to express his gratitude to the Cincinnati Board of Health, in whose laboratory he was given the opportunity to determine the physiological effects of these alkaloids.

Cincinnati, Ohio.

OIL CONTENT OF MANCHURIAN SOY BEANS.[1]

By Consul A. A. Williamson, Dairen.

The Dairen mills state that they are able to express about 12 per cent. of oil from soy beans, and the extraction mill, it is stated, obtained 20 per cent. But, as it is axiom that 48 kin of beans make a 4-kin cake and 4 kin of oil, the average proportion of oil obtained cannot exceed one twelfth, or 8⅓ per cent. In a long series of chemical analyses (119) to determine the oil content of beans, covering several years and all important production points, none containing full 20 per cent. of oil were found. The oil content varies considerably with the place of production, weather during growing season, etc., but just what the causes are is not yet apparent, probably soil and weather being the most powerful determining factors. The highest oil content found in the series was 19.88 per cent. in a sam-

[1] Supplementing report published in *Commerce Reports.* See also report on the methods of making soy-bean oil, American Journal of Pharmacy, February, 1918, p. 139.

ple from Changehun, but several ran over 19 per cent., while 14.72 per cent. was the lowest of the series, the remainder varying between the two extremes. In order to arrive at a proper average for the oil content of beans, 50 analyses were taken, and the result shown was 17.10 per cent. of oil, which is therefore a fair average quality (f. a. q.) bean-oil content. Anything above that, as 18 or 19 per cent., would indicate extra quality beans, and those with less than 17.10 per cent. of oil would be poor quality beans.

JAPANESE BLACK MINT.[1]

By Vice-Consul E. R. Dickover, Kobe.

Inquiry has come from the United States as to the feasibility of sending to that country black mint plants, from which menthol crystals and oil are made. Several attempts have been made in the past to send specimens of the mint plant to America, but all have resulted in failure. They can not be sent by ordinary freight, as the two or three weeks' trans-Pacific journey dries out the roots, resulting in the death of the plants. At one time, I am informed, special arrangements were made with the purser of a steamer and a shipment of mint plants were safely carried across the Pacific, being watered at suitable intervals; but upon arrival in America they were disinfected, and died as a result of this treatment. At present the Kobe consulate is making efforts to obtain mint seeds, but as the plant is usually propagated by slips or root-cuttings it has been found almost impossible to obtain seeds.

The black mint plant is grown in Japan, in two widely different climates. About 92 per cent. is grown on the Hokkaido (Yezo), the large northern island, where the average winter temperature is about 22° F., with a minimum of 10° F. below zero, and the average summer temperature is about 60° F., with a maximum of about 90° F. The average yearly rainfall is about 38 inches. The remaining 8 per cent. of the mint is grown in the prefectures of Okayama and Hiroshima on the main island, where the average winter temperature is about 38° F., with a minimum of about 20° F., and the average summer temperature is about 75° F., with a maximum of about 98° F. The average yearly rainfall in this district is 42.5 inches. As

[1] From *Commerce Reports*, May 7, 1918.

can be seen from this, the greatest part of the mint is grown in a climate similar to that of Virginia or North Carolina.

The mint plant requires a light, well-drained soil. The roots are planted (in Hiroshima and Okayama) at the end of November and the beginning of December. The plant attains its full growth during the summer months and is cut in the latter part of July, during August, and in the early part of September, three cuttings being made during the season. The third cutting yields the greatest percentage of oil and menthol crystals. The leaves are steamed and pressed in barrels by the planters, who then ship them to the menthol factories, of which there are 74 in various parts of Japan. There the oil is extracted from the leaves by a process of freezing and pressing.

THE NINETY-SEVENTH ANNUAL COMMENCEMENT OF THE PHILADELPHIA COLLEGE OF PHARMACY.

The ninety-seventh annual commencement exercises of the Philadelphia College of Pharmacy were held during the week commencing June 2. The Baccalaureate Services were held at the Church of St. Luke and the Epiphany on Sunday, June 2, at four P.M. The Rev. David M. Steele delivered, in his happiest mood, a very appropriate sermon to the students full of kindly advice and suggestion.

The complimentary supper tendered by the faculty to the graduating class was held in the College Hall on Monday evening and was a joyous occasion marred only by the absence of and the recollections of the loss of Prof. Remington.

The fifty-fourth anniversary reunion and dinner of the Alumni Association was held at Kugler's on Chestnut Street near Broad on Tuesday evening. The "three's and eight's classes" had the right of way this year and by their enthusiasm demonstrated their loyalty to their Alma Mater.

> "Whose echoes live in memory yet
> Though envious years would say forget."

The annual Commencement was on Wednesday evening, June 5, at the American Academy of Music. The address to the students was by Rev. Charles A. Eaton. The honorary degree of Master in Pharmacy (Ph.M.) was conferred on Professors E. Fullerton

Cook and Otto Raubenheimer. The degree of Master in Pharmacy *in course* was conferred upon the following candidates, Robert P. Fischelis, W. Wilson McNeary, Paul S. Pittenger.

Diplomas and certificates were conferred upon 162 students as per the following list.

DOCTORS IN PHARMACY (PHAR.D.).

Name.	Thesis.	Where From.
Di Silvestro, Miss Elisa	Actinella Odorata	Italy
Nichols, Adley Bonisteel	The Purification of Commercial Wool-Fat	Wisconsin
Raubenheimer, Herbert Carl.	Churchill's Tincture of Iodine	New York

DOCTORS IN PHARMACY (P.D.).

Students who have completed examinations and requirements for the degree of Doctor in Pharmacy (P.D.) who matriculated in 1915 or at a prior date:

Costello, Miss Genevieve Marie (P.C.)	Vanilla	Pennsylvania
Crane, Claude Harold	Antipyrine	No. Carolina
Hering, George (P.C.)	Tincture of Strophanthus	New Jersey
Leh, Elwood Henry	Cheap Liquid Soaps	Pennsylvania
Lenninger, Clifford (P.C.)	Tincture of Stropanthus	Wyoming
Price, John Wesley	Relations between the Pharmacist and the Physician	Pennsylvania
Russell, Miss Lillian (P.C.)	Magnesii Carbonas	Pennsylvania
Shoemaker, Alfred Weikel	Window and Show Case Trimming	Pennsylvania
Shumaker, Ralph Ritter	Artificial Maple Flavoring	Pennsylvania
Streamer, Charles Hayden Alexander (M.S.)	Chemistry of Iron	Pennsylvania
Thomas, John Aubrey	Sterilization	Pennsylvania
Weagley, Marburg Downin	"Ambrine"	Pennsylvania
Weiss, Edward Louis	Liquor Plumbi Subacetatis	Pennsylvania

PHARMACEUTICAL CHEMISTS (PH.C.).

Garr, Hyman David	Limit Tests for Methyl and Ethyl Alcohol	Pennsylvania
Herman, Abraham Lincoln	Analysis of Benzaldehyde	Pennsylvania
Hoffstein, Benjamin H.	Determination of Camphor Spirits and Liniment by Polariscope	Pennsylvania
McLaughlin, John R., Jr.	Direct Estimation of Sodium Benzene Sulphonate	Pennsylvania
Morgan, Thomas Asaph	Benedict's Solution	Pennsylvania
Snyder, Charles A.	Hypophosphorous Acid	Pennsylvania

GRADUATE IN PHARMACY (PH.G.).

Name.	Thesis.	Where From.
Barreras, Fernando	"Amygdala Dulcis" (Sweet Almond)	Porto Rico
Berkenstock, Mark John	Adulteration of Crude Drugs	Pennsylvania
Bogroff, Miss Rebecca	Bitter Almonds and Their Products	Pennsylvania
Boltz, Albert Dillman	Iodine and Its U. S. P. Preparations	Pennsylvania
Bond, Curtis Humphrey	Cosmetics, Purposes and Uses	Pennsylvania
Brady, Roscoe Owen	Non-Abrasive Antiseptic Tooth Paste	Pennsylvania
Bratton, Franklin Clair	Substitution of Corn Syrup for Sugar in the Manufacture of Soda Fountain Syrups	Pennsylvania
Brisgol, Morris	Solution of Magnesium Citrate	Pennsylvania
Brown, Leroy C. Parkman	Root of Eriogonum Tomentosum	Pennsylvania
Brustin, Miss Marie F	The Louisiana Sulphur	Russia
Burns, Miss Helen	Comparative Anatomy of Nux Vomica and Ignatia	Pennsylvania
Cartwright, Joseph David	Thymol	Pennsylvania
Coffey, Hiram Myers	"Fourth Edition of the National Formulary"	Pennsylvania
Cook, William Donald	Magma Magnesia	Pennsylvania
Curran, Albert Alphonsus	Advertising the Professional Drug Store	West Virginia
Diaz, Julio	Cultivation and Industry of Coffee in Porto Rico	Porto Rico
Eberly, Earle Kendig	Mineral Oil	Pennsylvania
Edwards, William Mason		Pennsylvania
Egan, Vincent Aloysius	Rhus Glabra	Pennsylvania
Ellis, Leslie	Chionanthus	Illinois
Finkelstein, Herman	Quality of Solution of Hydrogen Dioxide	Russia
Flood, James John	Solution of Magnesium Citrate	Pennsylvania
Foulk, James Floyd	Camphor	Pennsylvania
Garcia, (Birba) Ricardo	Cassava Starch	Cuba
Gardier, Louis Anthony	Picric Acid	Pennsylvania
Garvin, Luther B	Micromorphology of Stramonium and Belladonna and the Possibilities of Daturine as a Substitute for Atropine	Pennsylvania
Glantz, Morris	Lime Water	Pennsylvania
Glauser, Jacob	Pharmacognosy of Two Varieties of Aconite	Pennsylvania
Green, Harry		Pennsylvania
Green, Simon	Method of Standardization of Suprarenal Glands	Pennsylvania

Name.	Thesis.	Where From.
Gubenko, William P.	The International Metric System	Pennsylvania
Halligan, J. Clement	Petrolatum Liquidum	Pennsylvania
Hawkins, James Bryon	Tincture of Iodine	Montana
Hayes, Albert H.	Capsulating	Pennsylvania
Hooper, Herbert Hill	Cascara Sagrada	Pennsylvania
Hymes, David	Pepsin and Its Preparations and their Uses	Pennsylvania
Irete, Frank Lewis	Hydrastis Canadensis	Pennsylvania
Jorczak, Stanley Francis	Liquid Petrolatum	Connecticut
Karlheim, Dennis William	Chain Store System	Pennsylvania
Keller, Alexander George, Jr.		Pennsylvania
King, Standish Boardman	Browning	Massachusetts
Klebanoff, Bernard	Magma Bismuthi	Pennsylvania
Lacktman, Miss Jane	Serums and Vaccines	Russia
Lee, Joseph Lester	Crylolite	Pennsylvania
McBride, Thomas L.	Gossypium	No. Carolina
Marshall, William Crauthers.	Proximate Coal Analysis	Pennsylvania
Matthews, Harold Clifford.	Hops (Humulus Lupulus)	New Jersey
Melamed, Solomon	Soap Sold for Pure Castile	Pennsylvania
Menger, Miss Ruth Caroline.	Face Creams	Pennsylvania
Merkin, Israel	Prunus Serotina and its Chief Adulterant	Pennsylvania
Miller, George McCrea	Angustura Bark	Pennsylvania
Morales, Conrad		Cuba
Murphy, Frank Anthony	Iodine and Its Uses	Pennsylvania
Newsom, Henry Clay	Aspidium	No. Carolina
Packard, Miss Karleen	The History of Important African Drugs	Pennsylvania
Parris, Miss Bertha	Collection of Leguminous Drugs.	Russia
Phillipy, William Tell	Rabies, and the Pasteur Treatment	Pennsylvania
Puget, Jose Antonio	Tuberculins	Cuba
Rabinowitz, Miss Charlotte Gertrude	Phenol	Pennsylvania
Ramirez Hermogenes (Cabrera)		Cuba
Rappoport, Isadore	Sulphur in Ointments	Russia
Sackaloucas, Joseph William.	Cultivation of Solanaceous Drugs.	Pennsylvania
Seidelman, Miss Ida	Commercial Varieties of Capsicum Annum	Pennsylvania
Shafer, Herman S.	Emulsion of Cod Liver Oil	Pennsylvania
Smith, George Leo	Possibilities of a Modern Ethical Pharmacy	Pennsylvania
Sparks, Miss Ruth Everest.	Emulsions	New Jersey
Stein, Milton	Advertising in Pharmacy Today Compared with Thirty Years Ago	Pennsylvania

Name.	Thesis.	Where From.
Swabon, John Joseph	Cultivation of Belladonna	Pennsylvania
Tu, Kuen-Hua	Manufacture of Rice Starch	China
Turner, Charles Chester Currington	Glucose	Pennsylvania
Vehrs, Ernest Edward	Solubility of Cocaine and Codeine Alkaloids in Oils	Ohio
Walker, Lynne D.	Drug Store Advertising	Pennsylvania
Weitzman, Sydney Alan	Attracting the Public	Pennsylvania
Witman, Theodore David	Camouflaged Pharmaceuticals	Pennsylvania
Yob, John Thomas	Physiological Action and Therapeutic Uses of Atropine	Pennsylvania
Zacharias, Christian Boyd	Know the Drugs You Sell	Pennsylvania

Students who have completed the examinations and will receive their diploma upon reaching their majority:

Goodhart, Floyd R.	Infusion of Digitalis	Pennsylvania
Keiser, Paul Raymond	Own Make Greaseless Creams	Pennsylvania
Kerchner, Robert	Adulteration of Drugs	Pennsylvania
Pitchard, Frederick [illegible]	Phenol and a Fallacy Thereof	Pennsylvania
Quinn, Edward Schley Francis	The Cultivation of Castor Oil Plants	Pennsylvania
Rappaport, Nathaniel Herman	Unguentum Hydrargyri Nitratis	Pennsylvania
Rotman, Harry	Ergot, Preparation, Standardization and Uses	Russia
Schlegel, Alvin Lester	Modern Merchandising	Indiana
Shute, Joseph	Rheum (Rhubarb)	Pennsylvania
Snyder, Harold Berlin	Drug Store Policies	Pennsylvania
Stock, Roy Albert	A Few Facts about the More Important Vaccines	Pennsylvania
Troutman, Aaron J.	A Pharmacist in a Small Town	Pennsylvania
Walter, William John[1]		Pennsylvania
Wenner, John Alfred	Apidosperma, or Quebracha Bark	Pennsylvania

Students who have passed all Second Year Examinations and are eligible for the Degree of Ph.G. when the other graduation requirements shall have been met, and who will receive a Certificate attesting to these facts:

Abrams, Henry Reuby	A More Permanent Stramonium Ointment	Pennsylvania
Bair, Guy Frederick	Papain	Pennsylvania
	Tincture of Nux Vomica	Pennsylvania
Beechwood, Miss Mary Elizabeth	History of Several Official	
Brody, Miss Reba	South American Drugs	Russia

[1] Thesis not required.

Name.	Thesis.	Where From.
Brown, Israel	Iodine	Russia
Cantor, Benjamin H.	Relations with Wholesale Druggists	Pennsylvania
Davis, Miss Mae	Advertising in Pharmaceutical Journals	Pennsylvania
Duvoisin, Miss Lily	Oil of Betula as the Source of Salicylates	Pennsylvania
Eskin, Miss Sara	Manufacturing of Pharmaceutical Glassware	New Jersey
Filippone, Gaetano	Urinalysis	Italy
Finegan, William Francis	The Pituitary Body	New Jersey
Glass, Raphael	Cultivation of Belladonna	Pennsylvania
Godlewski, Charles Francis	Cinchonas	Pennsylvania
Judd, James Frederick	The Official and Unofficial Gall	Pennsylvania
Lower, John Wesley	Calx Chlorinata	Pennsylvania
Lung, Kwai Shoon	Four Typical Chinese Crude Drugs	Hawaii
McKendick, Wm. James	Pituitary Substance	Pennsylvania
Mandelbaum, Benjamin	Alcohol and Some of its Effects on the Human System	Pennsylvania
Promislo, Charles	Belladonna and Its Adulteration	Pennsylvania
Rabin, William Hagedorn	Facts Regarding Arsenic Trioxide on the Horse and Rat	Pennsylvania
Reubush, Robert Floyd	Comparison of Prescriptions	Virginia
Rohr, Reuben Abraham	Acetphenetidin	Pennsylvania
Rosenwald, Hymen	Dichloramine T	Pennsylvania
Schadt, Morris Granville	Iodine	Pennsylvania
Siemiontkowski, Miss Pauline	Perfumery	Pennsylvania
Slothower, George Ammon	Detection of Bichloride in Calomel	Pennsylvania
Slotter, Charles Franklin	Emetine	Pennsylvania

CERTIFICATE OF PROFICIENCY IN CHEMISTRY.

Huber, Donald Witherow, P.D.	Pennsylvania
McCorristin, Leo Joseph	New Jersey
Neeld, Percy Ingham	Pennsylvania
Schulhoff, Arthur S.	Pennsylvania
Slack, A. Schuyler	New Jersey

CERTIFICATE OF PROFICIENCY IN THE FOOD AND DRUG COURSE.

Henderson, Clarence Harry	California

SPECIAL CERTIFICATE IN ANALYSIS OF INDUSTRIAL PRODUCTS.

Kane, Bernard	Pennsylvania
Mervine, Joseph	Pennsylvania
Wishnefsky, Harry	New Jersey

SPECIAL CERTIFICATE IN ANALYSIS OF FUELS, OILS AND WATER.

Roberts, Everett Joseph ..... Pennsylvania

CERTIFICATE IN BACTERIOLOGY.

Comas, Miss Mercedes Elvira ..... Cuba
Feeny, Leonard A. ..... Pennsylvania
Folkrod, Cyril C. ..... Utah
Inman, Miss Florence Vatier ..... Missouri
Jorczak, Stanley Francis ..... Connecticut
Margerum, Donald C. ..... Pennsylvania
Martinez, Miss Carmen Aurora ..... Cuba
Martinez, Miss Matilde ..... Cuba
Mattson, H. Leo, P.D. ..... Pennsylvania
Myers, William Bryan ..... Pennsylvania
Reiter, George Hager ..... New Jersey
Steward, Charles Robert ..... Idaho
Whitehead, Russell Edward ..... Pennsylvania

CERTIFICATE IN ADVANCED PHARMACY.

Abrams, Henry Reuby ..... Pennsylvania

CERTIFICATE IN PHYSIOLOGIC ASSAYING.

Abrams, Henry Reuby ..... Pennsylvania
Green, Simon ..... Pennsylvania
Guici, Arnold ..... Italy

ANNUAL MEETING OF THE NATIONAL PHARMACEUTICAL SERVICE ASSOCIATION.

The June meeting of the National Pharmaceutical Service Association, which was also the annual meeting of that body, was held at the Philadelphia College of Pharmacy, on Tuesday Evening, June 11.

The chief features of the meeting were the reports of the officers. President Beringer reviewed the efforts of the Association in the drafting of the Edmonds Bill and having it introduced, and made a plea for greater coöperation on the part of pharmaceutical bodies generally, in making the movement for the Pharmaceutical Corps a success.

Secretary Robt. P. Fischelis reviewed the propaganda work that had been carried on during the year and announced that the mem-

bership now totaled to about 1,400. He earnestly requested the Association to relieve him from the duties of the secretaryship because of pressure of business and other association work.

All of the officers were given a vote of thanks for their efforts during the year and the following were elected to serve for the term of 1918–19:

President—George M. Beringer,
Vice-President—Charles H. LaWall,
Secretary—E. Fullerton Cook,
Treasurer—Josiah C. Peacock.

Executive Committee—
Joseph W. England, Philadelphia,
C. A. Mayo, New York,
Eugene G. Eberle, Philadelphia,
Samuel C. Henry, Chicago,
Louis Werner, Cincinnati,
Ambrose Hunsberger, Philadelphia,
Robert P. Fischelis, Philadelphia,
F. E. Stewart, Philadelphia,
William D. Robinson, Philadelphia.

Communications regarding the work of the Association and applications for membership should be addressed to Prof. E. Fullerton Cook, Secretary, at 145 North Tenth Street, Philadelphia.

CORRESPONDENCE.

THE FAIRCHILD SCHOLARSHIP.

PHILADELPHIA, June 10, 1918.

TO THE MEMBERS OF SCHOOLS OF PHARMACY, BOARDS OF PHARMACY AND PHARMACEUTICAL PUBLICATIONS:

The following notice has been authorized:

POSTPONEMENT OF EXAMINATION FOR THE FAIRCHILD SCHOLARSHIP SCHEDULED FOR JUNE 25, 1918.

In order to establish a plan of award for the Fairchild Scholarship in line with recommendations which should receive further consideration by the committee, I hereby give notice of postponement of such examination scheduled for June 25, 1918. Decision will be withheld until the A. Ph. A. Convention, at which time a meeting of said committee will be held. At latest, announcement will be made September 1, and scholarship awarded by October 1, 1918.

H. C. CHRISTENSON, *Chairman,*
Committee on Examination for Fairchild Scholarship,
4149 Vincennes St., Chicago, Ill.

Other members of the Committee are:
R. A. LYMAN, Lincoln, Neb.,
J. W. STURMER, Philadelphia, Pa.,
GEO. C. DIEKMAN, New York.

Chairman H. C. Christensen desires that notice be given of the above. The plan under consideration by the committee is in line with Recommendation 5 of President R. A. Lyman's address. The committee will hold a meeting during the Convention of the American Pharmaceutical Association in conjunction with the Fairchild Scholarship Committee.

In the meantime schools of pharmacy should prepare records of the qualifications of their leading students for the Fairchild Scholarship in line with Recommendation 5 of President R. A. Lyman's address, and which reads:

Recommendation No. 5.—That it be the sense of the Conference that Mr. Fairchild could render the greatest service to pharmacy by offering the Scholarship to a graduate pharmacy student, in order that he might pursue some research problem for one full school year, in the school of his choice;

and further, that this scholarship be awarded on the basis of the applicant's scholastic training, his standing as an undergraduate pharmaceutical student and upon his fitness to do research.

The action of the joint bodies at Indianapolis is recorded in the minutes of this meeting on pp. 60–64, inclusive, of the January issue, 1918, *Journal A. Ph. A.* A careful study of these pages is suggested.

It would seem advisable that each school decide on an eligible candidate for the Fairchild Scholarship. It is also advised that a record be kept of the preliminary education possessed by the prospective candidates, of their pharmaceutical training and education, of their ability to do research work.

The suggestion has been made, although this has not, as far as we know, been definitely agreed upon, that each school of the Conference propose *one* candidate, and that the deans of the schools furnish the Fairchild Scholarship Examination Committee with data which will form the basis of their decision.

Doubtless Chairman Christensen will notify all schools of the Conference, as promptly as is possible, of the conclusions reached by the committee, and make definite requests for information from them that is necessary for making the award. The plan does not contemplate any other examination, and therefore award will be made in time for next school term.

Schools and boards of pharmacy should confer with Chairman H. C. Christensen, whose address is 4149 Vincennes Ave., Chicago, Ill.

Respectfully,

E. G. EBERLE,
Chairman Fairchild Scholarship Committee.

A CORRECTION.

In the paper on "A Method for Cleaning Digitalis with a Study of the Inorganic Constituents," which was published in the April 1918, issue of this journal, the paragraph on page 249 relating to the qualitative determinations should read beginning with the fourth line as follows: Positive reactions were obtained from each of the above samples for iron, aluminum, manganese, calcium, magnesium, potassium, sodium, silicon, carbonates, chlorides, sulphates, and phos-

phates. Negative results were obtained for lead, mercury, silver, bismuth, copper, cadmium, arsenic, strontium, tin, chromium, cerium, nickel, zinc, cobalt, barium, antimony, lithium and nitrates.

C. H. ROGERS.

BOOK REVIEWS.

PHARMACEUTICAL BOTANY. By Heber W. Youngken, Ph.G., A.M., M.S., Ph.D. Second Edition, Revised and Enlarged with 195 Illustrations. Publishers P. Blakiston's Son & Co. Philadelphia.

This book has been written by a teacher of pharmacognosy who appreciates that with the adoption of pharmacognostic standards for many of the drugs in the U.S.P. and N.F., that pharmacognosy is to assume a still more important rôle in the curricula of pharmacy schools. Furthermore, that for the student of pharmacy to master the intricate subject of pharmacognosy, a "rather extended foundation in structural botany stands out preëminently as the most needed requirement." So this book has been especially prepared to meet the needs of pharmacy students.

The subject matters presented in this comparatively small volume of 386 pages are such as are necessary for the studies of the undergraduate and the more detailed studies of the structures of individual drugs have not been generally attempted. Very properly such are left to the special treatises to be considered in postgraduate studies. The attempt throughout this work appears to lay a thorough foundation for the student who is limited by the time allotted to this branch of pharmaceutical education, so that he nevertheless may acquire an intelligent understanding of the official standards.

The division of the subject and the systematic arrangement in chapters is admirable. The definitions, descriptions and statements are clearly, accurately, concisely, and not too technically stated, so that the readability is maintained and a subject that is prone to be looked upon as dry is presented in an inviting form.

In a subject so voluminous and intricate as pharmacognostical botany, it is impossible to give to the pharmacy student in the time allowed in the school course more than the foundation and the plan of teaching the fundamental plant structures by taking up the life history of a type appears to be a wise method of obtaining the best results.

Many of the illustrations are well executed and many are exceedingly appropriate as representing the text. A few, however, could have been improved upon, especially the microphotographs which in some instances exhibit the imperfection of the sections from which they have been prepared. For the purpose of clearly presenting illustrations of microscopic appearances, free-hand drawings would possibly have been better. In a few cases more appropriate illustratrations representing official drug plants might well have been selected.

On the whole, this will prove a most useful guide and handbook for the pharmacy student and especially to those whose preliminary education in botany was very limited or had no bearing on the special application thereof to drugs. The student who studies it as a textbook will not fail to have a fair basic knowledge of pharmaceutical botany and a clear understanding of the official standards for organic drugs.

G. M. B.

ANIMAL PARASITES AND HUMAN DISEASE. By Asa C. Chandler, M.S., Ph.D. Instructor in Zoölogy, Oregon Agricultural College, Corvallis, Oregon.

The volume is divided into three parts.

The author enters upon the interesting discussion of Protozoa in Part I, commencing with a brief consideration and historical review of exotic diseases, infection, immunity, and anaphylaxis. Chapter IV, comprising thirty-six pages, deals with the Spirochætes. Here the author has placed the important facts of our knowledge of relapsing fever, syphilis, yaws and infectious jaundice into form for the lay reader. He considers all the aspects of these diseases as it effects the individual, giving opinions of his own on some of the mooted questions relating to these infections. The remaining chapters under Part I contain a thorough description and review of leishman bodies and leishmaniasis, trypanosomes and sleeping sickness, intestinal flagellata, amœba, malaria and yellow fever.

Under Part II, there are many chapters devoted to a general consideration of the different kinds of worms, as tapeworms, hookworms, intestinal round worms, trichinæ, filariæ, and their allies. A brief description of the anatomy of these forms is followed by their life histories, their relation to infestation, together with methods of prevention and treatment.

Part III deals with Arthropods or the insects with their allies. Consideration in individual chapters is given to the arthropods in general, the mites, ticks, bedbugs, lice, fleas, mosquitos, book sucking flies, fly maggots and myiasis.

A carefully selected list of references to important articles on parasitology found in different periodicals and books furnishes valuable information, as the closing pages of this important volume, for any one who may desire further detailed knowledge on this subject.

The appearance of this carefully prepared and illustrated volume dealing with parasitology as related to human disease, marks a presentation of this subject in such a manner as to make it readable and useful not only to the parasitologist, but also to the layman and everyone interested in the progress of science and civilization. The work should serve a distinctly useful purpose in the fields for which it was intended.

LOUIS GERSHENFELD

OBITUARY.

CHARLES FORD DARE.

Charles F. Dare was born in Bridgeton, New Jersey, on May 19, 1842, and died suddenly in Newark, N. J., while on a brief visit, on Thursday, May 16, 1918.

Mr. Dare's early life was spent in Bridgeton, his parents moving to Philadelphia when he was young. He received his education in the schools of that city. He entered as an apprentice to the drug business at an early age; attended the Philadelphia College of Pharmacy, passing the examination successfully when less than twenty years of age. Graduating just at the commencement of the Civil War, he at once enlisted in Corn Exchange Regiment of Philadelphia, the regiment being so called from the fact that the Corn Exchange Bank had equipped the regiment at its own expense. Mr. Dare was appointed as hospital steward and remained in that capacity until the regiment was mustered out of the service at the end of the war.

On his return to Philadelphia, Mr. Dare received his diploma from the college, dated March, 1861. In the meantime, his parents had removed to Bridgeton and on his retirement from the Army he came to Bridgeton and was employed in the drug store of Edwin F.

Brewster, where he remained until 1872, when he embarked in business on his own account. This he conducted for several years, and then associated with him a young man in his employ, Harry B. Campbell, under the firm name of Charles F. Dare & Company. After a few years, Mr. Campbell, who was a registered pharmacist, retired from the firm to study dentistry. Mr. Dare then conducted the store alone until about 1890, when, the business having outgrown the old store, he purchased a handsome new building a few doors further down the street and associated with him his son, Charles W., who had graduated from the Philadelphia College of Pharmacy and also became a registered pharmacist, under the firm name of Charles F. Dare and Son, which is so continued at the present time.

Mr. Dare had practically devoted his entire life to the drug business, remaining in active practice until the end, nearly sixty years. He was laid to rest on the anniversary of his birth. Mr. Dare was a careful and competent pharmacist, affable in manner, a man of integrity and a successful business man, a steadfast friend, and an honorable, upright competitor.

Having the respect and confidence of the community, as he held many positions of trust outside of the drug business. He was a member of the board of directors of the Bridgeton National Bank from its foundation in 1883 and for more than thirty years the secretary of the Merchants and Mechanics Building and Loan Association. He was a member of the First Presbyterian Church, and a member of the board of trustees and its treasurer for more than twenty years. He was a member of the Masonic Order and a Past Noble Grand of the Order of Odd Fellows. He was a member of the American Pharmaceutical Association since 1889. He was a member of the New Jersey Pharmaceutical Association, having joined in 1874, and was secretary from 1889 to 1891 and its president in 1895. He was nearly always at the meetings and took an active and earnest part in its work.

His funeral was largely attended by his friends, his associates in the drug business in his home town and from different parts of the state, also by a few comrades from his old regiment.

Mr. Dare was married to Mary Borden, who passed away a few years since. He is survived by one son, Charles W., and a daughter, Mrs. Samuel A. Storey, of New York; two grandchildren, one of whom is named in honor of his grandfather; and two brothers, Isaac, of Camden, and John H., a pharmacist, residing in Bridgeton,

HENRY A. JORDEN.